

Document Database: Extended Abstracts

Updated July 2005

Advanced Systems

[PDF 3.0 MB](#)

Title: Architecture Case Studies Example Plans.

Author: Building Science Corporation

Pages/Volumes: 14 pp

Publication Year: 2001

Notes: Posted on this site with permission from the Building Science Consortium.

Subject Category: Advanced Systems

Document Type: Project Summaries

Abstract: The houses illustrated in this document will demonstrate sustainable building practices by integrating a number of strategies into one sensible design solution: using recycled low-polluting materials and controlled ventilation equipment to preserve natural resources and support environmentally progressive industries.

Report Numbers: 35238

[PDF 3.2 MB](#)

Title: Strategies for Achieving Low Energy Homes.

Author: Temple, K.

Pages/Volumes: 125 pp.

Publication Year: 2002

Notes: Posted on this site with permission from IBACOS.

Subject Category: Advanced Systems

Document Type: Technical Reports

Abstract: The objective of this report is to summarize efforts to integrate advanced systems into Building America Homes, with the goal of moving homes toward a 70% reduction in energy use for heating (space and water) and cooling, compared to homes that meet the Model Energy Code (MEC). A summary is presented of previous efforts by other organizations to develop low energy homes. The progression of IBACOS lab and pilot homes is presented with a description of the advanced systems used to achieve the associated energy performance. The Desert Country Home, currently under construction in Yuma, Arizona, is predicted to use 70% less energy than the MEC benchmark. This home includes a high performance envelope that includes structural insulated panels and low emissivity windows. Space heating and cooling is provided by a high-efficiency air-to-air heat pump. A methodology is presented for designing low energy homes, and six advanced systems are defined: high performance envelope, passive solar, efficient appliances and lighting, high efficiency mechanical systems, efficient domestic water heating, and systems to convert renewable energy sources.

Report Numbers: 34813



National Renewable Energy Laboratory

[PDF 594 KB](#)

Title: Design and Performance of the Van Geet Off-Grid Home: Preprint.

Author: Barley, C. D.; Torcellini, P.; Van Geet, O.

Pages/Volumes: 11 pp.

Publication Year: 2003

Notes: Prepared for the ISEC 2003: International Solar Energy Conference, 15-18 March 2003, Hawaii Island, Hawaii

Subject Category: Advanced Systems; Cold Climate

Document Type: Technical Reports

NTIS/GPO Number: 15002872

Abstract: The Van Geet home near Denver, Colorado, demonstrates the successful integration of energy conservation measures and renewable energy supply in a beautiful, comfortable, energy-efficient, 295-m² (3,176-ft²) off-grid home in a cold, sunny climate. Features include a tight envelope, energy-efficient appliances, passive solar heating (direct gain and Trombe wall), natural cooling, solar hot water, and photovoltaics. In addition to describing this house and its performance, this paper describes the recommended design process of (1) setting a goal for energy efficiency at the outset, (2) applying rules of thumb, and (3) using computer simulation to fine-tune the design. Performance monitoring and computer simulation are combined for the best possible analysis of energy performance. In this case, energy savings are estimated as 89% heating and cooling, 83% electrical, and nearly 100% domestic water heating. The heating and cooling energy use is 8.96 kJ/°C·day·m² (0.44 Btu/°F·day·ft²).

Report Numbers: CP-550-32764

[PDF 2.4 MB](#)

Title: Building America Field Project: Results for the Consortium for Advanced Residential Buildings (CARB), January to October 2001

Pages/Volumes: 38 pp.

Publication Year: 2002

Notes: Work performed by Steven Winter Associates, Inc., Norwalk, Connecticut.

Subject Category: Advanced Systems; Cold Climate; Cost-Performance Tradeoffs; Hot-Dry Climate; Hot-Humid Climate

Document Type: Project Summaries

NTIS/GPO Number: 15002036

Abstract: This report describes the various projects by the Consortium for Advanced Residential Buildings (CARB) that were active during the first 10 months of 2001, summarizing results, benefits, lessons learned, and future plans. The second part of this report describes technical matters, summarizing innovative technologies, systems engineering and results, and industry team member contributions.

Report Number: SR-550-31380

[PDF 3.4 MB](#)

Title: Residential Fuel Cell Demonstration Handbook: National Rural Electric Cooperative Association Cooperative Research Network

Author: Torrero, E.; McClelland, R.

Pages/Volumes: 88 pp.

Publication Year: 2002

Notes: Work performed by National Rural Electric Cooperative Association, Arlington, Virginia and Energy Signature Associates, Inc., Pittsburgh, Pennsylvania.

Subject Category: Advanced Systems; Other

Document Type: Technical Reports

NTIS/GPO Number: 15000844

Abstract: This report is a guide for rural electric cooperatives engaged in field testing of equipment and in assessing related application and market issues. Dispersed generation and its companion fuel cell technology have attracted increased interest by rural electric cooperatives and their customers. In addition, fuel cells are a particularly interesting source because their power quality, efficiency, and environmental benefits have now been coupled with major manufacturer development efforts. The overall effort is structured to measure the performance, durability, reliability, and maintainability of these systems, to identify promising types of applications and modes of operation, and to assess the related prospect for future use. In addition, technical successes and shortcomings will be identified by demonstration participants and manufacturers using real-world experience garnered under typical operating environments.

Report Number: SR-560-32455

No PDF

Title: Putting Technology into Practice. At the Village Green in Los Angeles, new kinds of partnerships and new energy-efficient applications work hand-in-hand
Author: James, M.; Peckler, D.
Source: Home Energy Magazine. March/April 2001
Pages/Volumes: pp. 42-44
Publication Year: 2001
Notes: Posted on the Web site with permission from Home Energy Magazine, which is available on the Web at www.homeenergy.org.
Subject Category: Affordable Housing; Advanced Systems
Document Type: Magazine/Newspaper Articles
Abstract: At the Village Green in Los Angeles, new kinds of partnerships and new energy-efficient applications work hand-in-hand.
Report Number: 31212

PDF 456 KB

Title: Hourly Simulation of Grid-Connected PV Systems Using Realistic Building Loads: Preprint
Author: Balcomb, J. D.; Hayter, S. J.; Weaver, N. L.
Pages/Volumes: 9 pp.
Publication Year: 2001
Notes: Prepared for the American Solar Energy Society (ASES) National Solar Conferences Forum 2001, 21-25 April 2001, Washington, D.C.
Subject Category: Advanced Systems
Document Type: Technical Reports
Abstract: This is one of two companion papers that describe the ENERGY-10 PV design tool computer simulation program. The other paper is titled "ENERGY-10 Photovoltaics: A New Capability." Whereas this paper focuses on the PV aspects of the program, the companion paper focuses on the implementation method. The case study in this paper is a commercial building application, whereas the case study in the companion paper is a residential application with an entirely different building load characteristic. Together they provide a balanced view.
Report Number: CP-550-29638

PDF 1.7 MB

Title: Energy Value Housing Award Guide: How to Build and Profit with Energy Efficiency in New Home Construction
Author: Sikora, J. L.
Pages/Volumes: 89 pp.
Publication Year: 2001
Subject Category: Advanced Systems
Document Type: Project Summaries
NTIS/GPO Number: 15000100
Abstract: As concern over the environment grows, builders have the potential to fulfill a market niche by building homes that use fewer resources and have lower environmental impact than conventional construction. Builders can increase their marketability and customer satisfaction and, at the same time, reduce the environmental impact of their homes. However, it takes dedication to build environmentally sound homes along with a solid marketing approach to ensure that customers recognize the added value of energy and resource efficiency. This guide is intended for builders seeking suggestions on how to improve energy and resource efficiency in their new homes. It is a compilation of ideas and concepts for designing, building, and marketing energy- and resource-efficient homes based on the experience of recipients of the national Energy Value Housing Award (EVHA).
Report Number: SR-550-28996

PDF 3 MB

Title: Design, Construction, and Performance of the Grand Canyon House Toward Net Energy Buildings Case Studies Series
Author: Balcomb, J. D.; Hancock, C. E.; Barker, G.
Pages/Volumes: 108 pp.
Publication Year: 1999
Subject Category: Advanced Systems; Cold Climate
Document Type: Project Summaries
NTIS/GPO Number: DE00009519

Abstract: The Grand Canyon house is a joint project of the DOE's National Renewable Energy Laboratory and the U.S. National Park Service and is part of the International Energy Agency Solar Heating and Cooling Programme Task 13 (Advanced Solar Low-Energy Buildings). Energy consumption of the house, designed using a whole-building low-energy approach, was reduced by 75% compared to an equivalent house built in accordance with American Building Officials Model Energy Code and the Home Energy Rating System criteria.

Report Numbers: TP-550-24767; DOE/GO-10099-795

[PDF 1 MB](#)

Title: Photovoltaic and Solar-Thermal Technologies in Residential Building Codes: Tackling Building Code Requirements to Overcome the Impediments to Applying New Technologies

Author: Wortman, D.; Echo-Hawk, L.

Pages/Volumes: 86 pp.

Editor: Weichman, J.; Hayter, S.; Gwinner, D., eds.

Publication Year: 1999

Notes: Prepared from a longer subcontractor report for the National Renewable Energy Laboratory, entitled "Renewable Energy and Energy Efficiency Technologies in Residential Building Codes", by David Wortman and Linda Echo-Hawk (September 20, 1998).

Subject Category: Advanced Systems

Document Type: Technical Reports

Abstract: This report describes the building code requirements and impediments to applying photovoltaic (PV) and solar-thermal technologies in residential buildings (one- or two-family dwellings). It reviews six modern model building codes that represent the codes to be adopted by most locations in the coming years: International Residential Code, First Draft (IRC), International Energy Conservation Code (IECC), International Mechanical Code (IMC), International Plumbing Code (IPC), International Fuel Gas Code (IFGC), and National Electrical Code (NEC). The IRC may become the basis for many of the building codes in the United States after it is released in 2000, and it references the other codes that will also likely become applicable at that time. These codes are reviewed as they apply to photovoltaic systems in buildings and building-integrated photovoltaic systems and to active-solar domestic hot-water and space-heating systems. The first discussion is on general code issues that impact these technologies—for example, solar access and sustainability. Then, secondly, the discussion investigates the relationship of the technologies to the codes, providing examples, while keeping two major issues in mind: How do the codes treat these technologies as building components? and Do the IECC and other codes allow reasonable credit for the energy impacts of the technologies? The codes can impact the implementation of the above technologies in several ways: (1) The technology is not mentioned in the codes. It may be an obstacle to implementing the technology, and the solution is to develop appropriate explicit sections or language in the codes. (2) The technology is discussed by the codes, but the language is confusing or ambiguous. The solution is to clarify the language. (3) The technology is discussed in the codes, but the discussion is spread over several sections or different codes. Practitioners may not easily find all of the relevant material that should be considered. The solution is to put all relevant information in one section or to more clearly reference relevant sections. (4) The technology is prohibited by the code. Examples of this situation were not found. However, energy credit for some technologies cannot be achieved with the requirements of these codes. Finally, four types of future action are recommended to make the codes reviewed in this report more accommodating to renewable energy technologies: (1) Include suggested language additions and changes in the codes; (2) Create new code sections that place all of the requirements for a technology in one section of an appropriate code; (3) Apply existing standards, as appropriate, to innovative renewable energy and energy conservation technologies; and (4) Develop new standards, as necessary, to ease code compliance. A synergy may be possible in developing suitable code language changes for both photovoltaic and solar hot-water systems. The installation of rooftop photovoltaic panels and solar hot-water collectors involves many overlapping issues. Roof loading, weather tightness, mounting systems, roof penetrations, and similar concerns are identical for both technologies. If such work can be coordinated, organizations supporting both technologies could work together to implement the appropriate revisions and additions to the codes.

Report Number: TP-550-26579

Title: Tierra Concrete Homes: Low-Energy Residential Building Design

Author: Hayter, S. J.; Torcellini, P. A.; Neimeyer, J.

Source: Proceedings of the 22nd National Passive Solar Conference, 25-30 April 1997, Washington, D.C.

Pages/Volumes: pp. 1-4

Editor: Campbell-Howe, R.; Wilkins-Crowder, B., eds.

Publication Year: 1997

Publisher, Place: Boulder, CO: American Solar Energy Society

Subject Category: Cold Climate; Advanced Systems

Document Type: Technical Reports

Abstract: Using a whole building design concept, Tierra Concrete Homes, a home builder in Pueblo, Colorado, created low-energy, passive solar home designs. Passive solar features incorporated into the designs include house orientation, high-mass walls for thermal storage, exterior insulation, appropriate glazing type combined with overhangs to prevent summer overheating, open interior spaces to maximize daylighting potential, and high efficiency lighting. These ranch-style homes require no cooling and minimum heating equipment to maintain comfortable indoor conditions. They are economically competitive to build, consume little fossil fuel, and produce virtually no construction waste. This paper discusses how the design of one of these homes was optimized to further minimize energy consumption while maintaining an attractive livable environment. It also describes monitoring activities that are currently underway to verify predicted energy consumption.

Report Number: 22682

Affordable Housing

[PDF 847 KB](#)

Title: Affordable High-Performance Homes: The 2002 NREL Denver Habitat for Humanity House, A Cold-Climate Case Study.

Author: Norton, P.; Stafford, B.; Carpenter, B.; Hancock, C.E.; Barker, G.; Reeves, P.; Kriescher, P.

Pages/Volumes: 19 pp.

Publication Year: 2005

Subject Category: Cold Climate; Affordable Housing

Document Type: Project Summaries

Abstract: A trend towards "green" building with a focus on energy efficiency is sweeping the United States homebuilding industry. An integrated systems-design approach leads to homes that are more efficient, more comfortable, more affordable, and more durable than homes built with standard practices. Habitat for Humanity affiliates throughout the country are taking the lead on this approach to home building for affordable housing. This approach supports Habitat's goals of supplying quality housing and reducing the energy cost burden on families in Habitat homes—goals that are especially important in these days of increasing energy costs.

Report Numbers: TP-550-36150

[PDF 627 KB](#)

Title: Habitat Metro Denver—Perfecting Award-Winning Affordable Homes Using Building America's Integrated Design Approach. Building America (Brochure).

Pages/Volumes: 6 pp.

Publication Year: 2004

Subject Category: Cold Climate; Onsite Power Systems

Document Type: Project Summaries

Abstract: Habitat for Humanity's goal is to supply quality housing to poor families while reducing their energy cost burden, especially in light of ever-increasing energy prices. Habitat Metro Denver partnered with the U.S. Department of Energy's Building America Project and the National Renewable Energy Laboratory to improve their construction and design process to create an affordable home that is not only cost-effective and volunteer friendly to build but highly energy efficient and a comfortable place to live.

Report Numbers: BR-550-36102; DOE/GO-102004-2030

[PDF 228 KB](#)

Title: Moving Toward Zero Energy Affordable Housing.

Author: Home Energy Magazine

Pages/Volumes: 2 pp

Publication Year: 2004

Notes: Posted on this site with permission from Home Energy Magazine.

Subject Category: Onsite Power Systems; Cold Climate; Affordable Housing

Document Type: Magazine/Newspaper Articles

Abstract: The Claretian Associates, a nonprofit organization established by an order of Roman Catholic priests and brothers, are building highly energy-efficient homes on the south side of Chicago, in a neighborhood known as South Chicago. This community was once the home of U.S. Steel's South Works plant, a factory that supplied the steel used for America's industrial expansion from 1880 through most of the twentieth century. The South Works plant employed about 20,000 workers in the 1940s, but by the 1980s it had dwindled down to a few hundred employees, and it closed entirely in 1992. Most of the other industrial plants in the community have either gone out of business or left for warmer climates.

Report Numbers: 36475

[PDF 462 KB](#)

Title: Read This Before You Turn Over A Unit

Author: Lstiburek, J.; Brennan, T.

Source: www.buildingscience.com.

Pages/Volumes: 12 pp.

Publication Year: 2001

Publisher, Place: Building America Consortium

Notes: Posted on the Web site with permission from Building Science Consortium.

Subject Category: Affordable Housing; Envelope and Window Systems; Ventilation Systems; Hot Water Systems; Cooling Systems

Document Type: Bulletins

Abstract: This document helps landlords provide safe housing, keeping in mind the issues of asthma, health, ventilation, pests, and chemicals.

Report Number: 32115

[PDF 352 KB](#)

Title: Read This Before You Move In

Author: Lstiburek, J.; Brennan, T.

Source: www.buildingscience.com.

Pages/Volumes: 12 pp.

Publication Year: 2001

Notes: Posted on this Web site with permission from the Building Science Consortium.

Subject Category: Affordable Housing; Envelope and Window Systems; Ventilation Systems; Hot Water Systems; Cooling Systems

Document Type: Bulletins

Abstract: This document provides advice for healthy and affordable housing: practical recommendations for building, renovating, and maintaining housing.

Report Number: 32116

[PDF 550 KB](#)

Title: Bringing Big Builders to Efficiency

Author: Tully, G.

Source: Home Energy Magazine. March/April 2000

Pages/Volumes: p. 12

Publication Year: 2000

Notes: Posted on this Web site with permission from Home Energy Magazine, which is available on the Web at www.homeenergy.org.

Subject Category: Affordable Housing

Document Type: Magazine/Newspaper Articles

Abstract: For several years, Consortium for Advanced Residential Buildings—one of five DOE Building America teams—has been producing cost-effective, energy-saving prototype homes, with the goal of convincing builders to bring these technologies into the marketplace.

Report Number: 31211

[PDF 301 KB](#)

Title: Building America Developments, September 2000, Information Bulletin Number 1 (Rev. July 2001)

Author: Hendron, R.; Anderson, J.; Epstein, K.

Pages/Volumes: 4 pp.

Publication Year: 2000

Notes: Available electronically only.

Subject Category: Affordable Housing

Document Type: Bulletins

Abstract: Building America Developments on-line newsletter highlights the Erie-Ellington Homes publicly-funded housing project in Boston, Massachusetts. A Building America and industry partnership that produced energy-efficient manufactured homes built with foam core panels is featured. Also, Habitat for Humanity dedicates two energy-efficient test houses in East Tennessee, and affordable, healthy homes are offered in metro Atlanta. Upcoming events in the Building America Program are also listed.

Report Number: BR-550-28583

[PDF 863 KB](#)

Title: Erie-Ellington Homes: Affordable + Green

Source: Environmental Building News. Vol. 9(7/8) July/August 2000

Pages/Volumes: pp. 6-7

Publication Year: 2000

Notes: Copyright 2000, BuildingGreen, Inc. Posted on this site with permission from Environmental Building News.

Subject Category: Affordable Housing

Document Type: Magazine/Newspaper Articles

Abstract: A ribbon-cutting ceremony for the 50-unit Erie-Ellington Homes housing project was held on June 22. The triplex units cost \$94 per square foot to build—25% below market rates in the area—and are projected to use just half as much energy as conventional houses.

Report Number: JA-610-31146

[PDF 1.5 MB](#)

Title: Erie-Ellington Homes: The Green Story

Pages/Volumes: 2 pp.

Editor: Hickory Consortium

Notes: Posted on this Web site with permission from GreenVillage Company / Hickory Consortium.

Subject Category: Affordable Housing; Cold Climate

Document Type: Project Summaries

Abstract: The Erie-Ellington Homes development brings 50 beautiful, affordable homes and a community center to the Four Corners Neighborhood of Boston. It provides a model for residential development of quality, community-based, affordable housing.

Report Number: 30944

Air Distribution Systems

[PDF 15.4 MB](#)

Title: International Energy Agency Building Energy Simulation Test and Diagnostic Method for Heating, Ventilating, and Air-Conditioning Equipment Models (HVAC BESTEST): Volume 2: Cases E300-E545.

Author: Neymark J.; Judkoff, R.

Pages/Volumes: 312 pp.

Publication Year: 2004

Subject Category: Performance Analysis and Tests

Document Type: Technical Reports

Abstract: This report documents an additional set of mechanical system test cases that are planned for inclusion in ANSI/ASHRAE STANDARD 140. The cases test a program's modeling capabilities on the working-fluid side of the coil, but in an hourly dynamic context over an expanded range of performance conditions. These cases help to scale the significance of disagreements that are less obvious in the steady-state cases. The report is Vol. 2 of HVAC BESTEST Volume 1. Volume 1 was limited to steady-state test cases that could be solved with analytical solutions. Volume 2 includes hourly dynamic effects, and other cases that cannot be solved analytically. NREL conducted this work in collaboration with the Tool Evaluation and Improvement Experts Group under the International Energy Agency (IEA) Solar Heating and Cooling Programme Task 22.

Report Numbers: TP-550-36754

[No PDF](#)

Title: Framework for Coupling Room Air Models to Heat Balance Model Load and Energy Calculations (RP-1222).

Author: Griffith, B.; Chen, Q.

Source: HVAC&R Research. Vol. 10(2) April 2004

Pages/Volumes: pp. 91-111

Publication Year: 2004

Subject Category: Performance Analysis and Tests

Document Type: Technical Reports

Report Numbers: JA-550-36484

[No PDF](#)

Title: Infiltration and Natural Ventilation Model for Whole Building Energy Simulation of Residential Buildings.

Author: Deru, M. P.; Burns, P. J.

Source: ASHRAE Transactions: Symposia. 2003

Pages/Volumes: pp. 801-811

Publication Year: 2003

Notes: For preprint version, including full text online document, see NREL/CP-550-33698.

Subject Category: Ventilation Systems

Document Type: Technical Reports

Abstract: The infiltration term in the building energy balance equation is one of the least understood and most difficult to model. For many residential buildings, which have an energy performance dominated by the envelope, it can be one of the most important terms. There are numerous airflow models; however, these are not combined with whole-building energy simulation programs that are in common use in North America. This paper describes a simple multizone nodal airflow model integrated with the SUNREL whole-building energy simulation program.

Report Numbers: CP-550-35493

[No PDF](#)

Title: Whole Building Energy Simulation with a Three-Dimensional Ground-Coupled Heat Transfer Model.

Author: Deru, M.; Judkoff, R.; Neymark, J.

Source: ASHRAE Transactions 2003: Technical and Symposium Papers Presented at the 2003 Winter Meeting of the American Society of Heating, Refrigerating and Air-Conditioning Engineers, 26-29 January 2003, Chicago, Illinois. ASHRAE Transactions, Vol. 109, Part 1.

Pages/Volumes: Vol. 109, Part 1: pp. 557-565

Publication Year: 2003

Publisher, Place: Atlanta, GA: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.

Notes: For preprint version, including full text online document, see NREL/CP-550-32690.

Subject Category: Performance Analysis and Tests; Heating Systems

Document Type: Technical Reports

Abstract: A three-dimensional, finite-element, heat-transfer computer program was developed to study ground-coupled heat transfer from buildings. It was used in conjunction with the SUNREL whole-building energy simulation program to analyze ground-coupled heat transfer from buildings, and the results were compared with the simple ground-coupled heat transfer models used in whole-building energy simulation programs. The detailed model provides another method of testing and refining the simple models and analyzing complex problems. This work is part of an effort to improve the analysis of the ground-coupled heat transfer in building energy simulation programs. The output from this detailed model and several others will form a set of reference results for use with the BESTEST diagnostic procedure. We anticipate that the results from the work will be incorporated into ANSI/ASHRAE 140-2001, Standard Method of Test for the Evaluation of Building Energy Analysis Computer Programs.

Report Numbers: CP-550-35034

[PDF 82 KB](#)

Title: Procedures for HVAC System Design and Installation.

Author: ConSol Energy Consultants

Pages/Volumes: 5 pp

Publication Year: 1999

Notes: Posted on this site with permission from ConSol.

Subject Category: Heating Systems; Air Distribution Systems; Cooling Systems

Document Type: Bulletins

Abstract: The goal for a HVAC system is to provide proper air flow, heating, and cooling to each room. This document sets out key criteria that describe a quality system, and key design and installation considerations that should be met to achieve this goal. The following pages contain more detailed information on design, fabrication, installation, and performance testing.

Report Numbers: 35625

[PDF 1.3 MB](#)

Title: HVAC Optimization Strategies: IBACOS Quality Home Newsletter March 2003.

Author: IBACOS

Pages/Volumes: 8 pp.

Publication Year: 2003

Notes: Posted on this site with permission from IBACOS.

Subject Category: Heating Systems; Air Distribution Systems; Cooling Systems; Envelope and Window Systems

Document Type: Bulletins

Abstract: When buying a new home, homeowners assume that the HVAC system will keep them cool in the summer and warm in the winter. In an attempt to avoid customer complaints about comfort, HVAC contractors often specify too many HVAC units, or individual units that are simply too large for the home. The idea seems to be to provide far more than what is necessary, as "insurance" against having to send a service technician out to the house to deal with comfort complaints after move in. But, oversized systems compromise the home's efficiency and can sacrifice other aspects of the home's performance. In fact, oversized systems can cause comfort issues—exactly what the contractor is trying to avoid. For example, oversized cooling systems run less, providing less dehumidification, which can cause cold, clammy conditions in the summertime. So what's the solution to oversized systems? Optimize the system through deliberate engineering and ensure that the rest of your home performs appropriately.

Report Numbers: 35399

[PDF 416 KB](#)

Title: Fibrous Glass Duct Board White Paper.

Author: Bolibruck, S.; Oberg, B.

Pages/Volumes: 8 pp.

Publication Year: 2003

Notes: Posted on this site with permission from IBACOS.

Subject Category: Air Distribution Systems

Document Type: Design Guides

Abstract: In this white paper, IBACOS describes the characteristics and benefits of fibrous glass duct board, and addresses issues specific to fibrous glass duct construction, including the concern that fibrous glass ducts collect water and support growth of mold. IBACOS assumes no responsibility and accepts no liability for the application of the principles or techniques contained in this white paper.

Report Numbers: 35396

[PDF 1.6 MB](#)

Title: Observations on Changing Residential Design Conditions and Recommendations for Register Assessment for the High Performance Home

Author: Holton, J.K.

Source: ASHRAE Transactions: Research. Vol. 108(2) 2002

Pages/Volumes: pp. 351-359

Publication Year: 2002

Notes: The following article was published in ASHRAE Transactions (Volume 108, Part 2, pp. 351-359). © 2002 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. This posting is by permission of ASHRAE and is presented for educational purposes only. ASHRAE does not endorse or recommend commercial products or services. This article may not be copied and/or distributed electronically or in paper form without permission of ASHRAE. Contact ASHRAE at www.ashrae.org.

Subject Category: Air Distribution Systems

Document Type: Technical Reports

Abstract: There are significant differences between the conditions for which registers have traditionally been designed and tested and the conditions in today's high performance house. This paper examines many of these differences through field evaluation studies and test chamber experiments. It proposes a new set of topics to develop a set of register performance

measures that are more appropriate to high performance residential applications.

Report Number: 33074

[PDF 129 KB](#)

Title: Your New Home: Duct Hunting, Part I

Author: Salant, K.

Source: The Daily Camera. Vol. Section G January 28, 2001

Pages/Volumes: pp. 15G

Publication Year: 2001

Publisher, Place: Boulder, CO: The Daily Camera

Notes: Reprinted courtesy of The Daily Camera.

Subject Category: Air Distribution Systems

Document Type: Magazine/Newspaper Articles

Abstract: With the Building America approach, buyers pay a minimal amount extra to get energy efficiencies and greater comfort and savings from day one.

Report Number: 31936

[PDF 151 KB](#)

Title: Your New Home: Duct Hunting, Part II

Author: Salant, K

Source: The Daily Camera. Vol. Section G February 4, 2001

Pages/Volumes: pp. 19G

Publication Year: 2001

Publisher, Place: Boulder, CO: The Daily Camera

Notes: Reprinted courtesy of The Daily Camera.

Subject Category: Air Distribution Systems

Document Type: Magazine/Newspaper Articles

Abstract: With the Building America approach, buyers pay a minimal amount extra to get energy efficiencies and greater comfort and savings from day one.

Report Number: 31937

[PDF 573 KB](#)

Title: Building America System Performance Test Practices: Part 2, Air Exchange Measurements

Author: Hancock, E.; Norton, P.; Hendron, B.

Pages/Volumes: 25 pp.

Publication Year: 2002

Subject Category: Air Distribution Systems; Performance Analysis and Tests; Ventilation Systems

Document Type: Technical Reports

NTIS/GPO Number: 15000840

Abstract: Staff at the National Renewable Energy Laboratory's Center for Buildings and Thermal Systems and associated contractors perform experiments to quantify the air-exchange characteristics of homes built within the Building America program. This report documents the test practices used. The document was prepared to increase understanding of the advantages and limitations of the approach described. This document is not intended to be a standard protocol for these test measurements.

Report Number: TP-550-30270

[PDF 696 KB](#)

Title: McStain Sets IAQ Standard

Author: Andrews, S.

Source: HomeBuilder Magazine. January 2001

Pages/Volumes: pp. 13-15

Publication Year: 2001

Notes: Posted with permission from the HomeBuilder's Association of Metropolitan Denver.

Subject Category: Ventilation Systems; Air Distribution Systems; Cold Climate

Document Type: Magazine/Newspaper Articles

Abstract: McStain Enterprises builds homes in the Denver, Colorado, Metropolitan area. Soon, this company will incorporate a simple, yet effective, controlled ventilation system in all homes it builds. The company's goal is to score no lower than 84 on the E-Start rating scale.

Report Number: JA-610-31045

Title: Evaluation of Turbulence Effect on Air Distribution Performance Index (ADPI)
Author: Abu-El-Hassan, M. B.; Hosni, M. H.; Miller, P. L.
Source: ASHRAE Transactions 1996: Technical and Symposium Papers Presented at the 1996 Annual Meeting of the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., 22-26 June 1996, San Antonio, Texas. ASHRAE Transactions, Vol. 102, Part 2.
Pages/Volumes: pp. 322-331
Publication Year: 1996
Publisher, Place: Atlanta, GA: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.
Subject Category: Air Distribution Systems
Document Type: Technical Reports
Abstract: Proper distribution of conditioned air plays an important role in both the comfort of the occupants and the air quality of ventilated or air-conditioned spaces. Conditioned air should be supplied in proper quantities and temperatures to meet various thermal requirements of occupied spaces. Large air velocities, temperature gradients, and turbulence intensities should be avoided since these factors either individually or combined, may cause draft, which is undesirable for occupants. The main objectives of this study were to evaluate the air distribution performance index (ADPI) based on measured centerline data and determine the effect of turbulence on ADPI. The data were collected in a large room (24 by 16 by 9 ft [7.3 by 4.9 by 2.7m]) with a high sidewall grill. The airflow characteristics at the centerline of the room for 21 cases under both isothermal and nonisothermal flow conditions were investigated. The results showed that ADPI values determined using the "centerline" data and the "whole room" data were approximately the same. The ADPI results were strongly dependent on the room heat load and the airflow rate. The effect of turbulence on ADPI was investigated using a comfort model, and a modified ADPI model was presented. The results showed that the turbulence intensity strongly affected ADPI values at high airflow rates.
Report Number: 23349

Title: Toward a Simplified Design Method for Determining the Air Change Effectiveness
Author: Rock, B. A.; Brandemuehl, M. J.; Anderson, R. S.
Source: ASHRAE Transactions 1995: Technical and Symposium Papers Presented at the 1995 Winter Meeting of the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., 25-29 January 1995, Chicago, Illinois. ASHRAE Transactions, Vol. 101, Part 1.
Pages/Volumes: pp. 217-227
Publication Year: 1995
Publisher, Place: Atlanta, GA: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.
Notes: Copyright 1995 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. This posting is by permission of ASHRAE and is presented for educational purposes only. ASHRAE does not endorse or recommend commercial products or services. This article may not be copied and/or distributed electronically or in paper form without permission of ASHRAE. Contact ASHRAE at www.ashrae.org.
Subject Category: Air Distribution Systems
Document Type: Technical Reports
Abstract: Modeling techniques for the design and analysis of air diffusion in occupied rooms are being developed to provide a simple and reliable method for determining heating, ventilating, and air-conditioning (HVAC) system compliance with ventilation standards. Simplified two-region models of rooms are used with six occupancy patterns to find the air change effectiveness.
Report Number: 21021

Cold Climate

Title: Some Research Begins at Home.
Author: Kent, J.
Source: Home Energy Magazine. November/December 2003
Pages/Volumes: 5 pp
Publication Year: 2004
Subject Category: Cold Climate
Document Type: Magazine/Newspaper Articles

Abstract: At Integrated Building and Construction Solutions (IBACOS), our mission is to research, evaluate, and test new systems and methods used to design and build homes to higher levels of performance. Cost and time constraints often prevent production home builders from fully exploring innovative design and construction strategies. In 2002 and 2003, IBACOS had the opportunity to take a home "off line" and dig into the practices necessary to design and build to extremely high levels of performance—in terms of occupant safety, health, and comfort, as well as building durability and efficiency.

Report Numbers: 36011

[PDF 2.9 MB](#)

Title: Building America's High Performance Communities: Setting the Example.

Author: Prah, D.

Pages/Volumes: 6 pp.

Publication Year: 2003

Notes: Posted on this site with permission from IBACOS.

Subject Category: Cold Climate

Document Type: Project Summaries; Presentations

Abstract: This document was a presentation given at the Greenprints Conference, Atlanta, GA, February 2003.

Report Numbers: 35397

[PDF 4.8 MB](#)

Title: Mountain Home Energy.

Author: Van Geet, O.

Pages/Volumes: 6 pp.

Publication Year: 2003

Notes: Posted on this site with permission from Home Energy Magazine.

Subject Category: Cold Climate

Document Type: Magazine/Newspaper Articles

Abstract: There are benefits to living closer to the sun than the average family does, even in Colorado. The views are spectacular. And the sun can play the lead role in providing heat and electricity. My family home near Denver is an example of energy conservation measures coupled with renewable energy supply. The remote location—with no utility connections available—and my interest in renewable materials and energy have motivated an ambitious design. Also, the Building America program at the National Renewable Energy Laboratory (NREL) provided energy engineering throughout the design, construction, and performance evaluation of our home.

Report Numbers: 35350

[PDF 5.8 MB](#)

Title: A New York Success Story.

Author: Padian, A.

Pages/Volumes: 4 pp.

Publication Year: 2003

Notes: Posted on this site with permission from Home Energy Magazine.

Subject Category: Cold Climate

Document Type: Magazine/Newspaper Articles

Abstract: Typically affordable housing in New York City is built to be affordable only in terms of the first cost, making maintenance and energy costs a burden to first-time home buyers, cooperators, and not-for-profit organizations that own or manage such buildings. Melrose Commons II, a one-block grouping of 30 beautiful, highly energy-efficient owner-occupied three-family homes, is breaking that mold.

Report Numbers: 35008

[PDF 935 KB](#)

Title: Builder System Performance Packages.

Author: Broniek, J.

Pages/Volumes: 9 pp.

Publication Year: 2003

Notes: Posted on this site with permission from IBACOS.

Subject Category: Cold Climate; Mixed-Humid Climate

Document Type: Design Guides

Abstract: This report presents system design packages for cold and mixed-humid climates. Builders and contractors can use these design packages to construct homes that achieve a Home

Energy Rating System (HERS) score between 86 and 88. This represents a reduction in space conditioning and domestic hot water energy consumption of between 30% and 40%, compared to a similar home built to meet the 1993 Model Energy Code. The six different design packages, three for each climate zone, give the builder flexibility in their design strategy by allowing them to choose the most cost effective approach. The recommendations presented in these design packages are based on more than ten years of experience that IBACOS has had working with builders throughout the United States on Building America projects.

Report Numbers: 34814

[PDF 10.4 MB](#)

Title: High Performance, Affordable Housing in New York's South Bronx

Author: Padian, A.

Source: Automated Builder. April 2003

Pages/Volumes: pp. 36-37

Publication Year: 2003

Notes: Posted on this site with permission from Automated Builder.

Subject Category: Cold Climate

Document Type: Magazine/Newspaper Articles

Abstract: A housing developer in the South Bronx has built the first Energy Star affordable housing project in New York State, and these three-family homes' tightness can primarily be tied to the use of precast concrete panels. The panels are one piece of a whole-building approach that included high-performance windows, properly sized high-efficiency heating and domestic hot water systems. Energy Star lighting and appliances, low-VOC paints, and both recycled and safer building materials. These houses are modeled to use almost 75% less heating energy than other New York City affordable housing, and are a beautiful addition to the urban streetscape.

Report Number: 35006

[PDF 643 KB](#)

Title: Testing and Monitoring of the READ Project House, East Lansing, Michigan (BAIHP)

Author: Rudd, A.

Pages/Volumes: 9 pp.

Publication Year: 2003

Notes: Posted on this site with permission from Building America Industrialized Housing Partnership.

Subject Category: Cold Climate

Document Type: Project Summaries

Abstract: The Resource Efficient and Affordable Demonstration (READ) project in East Lansing, Michigan, is an 1800 ft² entry level house. The house design originated from the Center for Housing Innovation at the University of Oregon and was modified by John Barrie Associates. The most significant changes to the original design was the addition of a full basement in place of a crawl space, and an enlarged front porch. The entire building envelope, including basement walls, was constructed with structural insulated panels (SIPs). Several private companies collaborated on the project. The U.S. Dept. of Energy, Energy Efficient Industrialized Housing (EEIH) program supported the energy and environmental testing and monitoring through the Florida Solar Energy Center (FSEC).

Report Number: 34807

[No PDF](#)

Title: Design and Performance of the Van Geet Off-Grid Home

Author: Barley, D. C.; Torcellini, P.; Van Geet, O.

Source: Proceedings of the ISEC 2003: International Solar Energy Conference, 15-18 March 2003, Kohala Coast, Hawaii.

Pages/Volumes: pp. 1-8

Publication Year: 2003

Publisher, Place: New York: American Society of Mechanical Engineers

Notes: For preprint version, including full text online document, see NREL/CP-550-32764.

Subject Category: Advanced Systems; Cold Climate

Document Type: Technical Reports

Report Number: CP-550-34735

[PDF 1.6 MB](#)

Title: Builder's Guide to Cold Climates

Author: Lstiburek, J.

Pages/Volumes: 16 pp.

Publication Year: 2001

Notes: Posted on this Web site with permission from Building Science Consortium.

Subject Category: Cold Climate

Document Type: Design Guides

Abstract: This builder's guide for cold climates includes hundreds of pages of illustrations and resources on such subjects as house layout and design, foundations, framing, hvac, insulation, drywall, plumbing, electrical systems, painting, sheathings and windows all with respect to moisture control, energy efficiency and proper ventilation.

Report Number: 31217

[PDF 845 KB](#)

Title: EcoVillage Cleveland at 58th Street, Cleveland, Ohio

Source: Building Science Consortium.

Pages/Volumes: 2 pp.

Notes: Posted on this site with permission from Building Science Consortium.

Subject Category: Cold Climate

Document Type: Project Summaries

Abstract: The premise of the Building America program is that high performance homes must be sustainable both environmentally and economically. EcoVillage Cleveland takes this premise to a new level. From location to lumber to lighting—energy efficiency, resource efficiency, and durability rule at EcoVillage Cleveland, but not without affordability. For EcoVillage Cleveland is about local and individual sustainability.

Report Numbers: 35205

[PDF 675 KB](#)

Title: Prairie Crossing, Prairie Holdings Corporation, Grayslake, Illinois

Source: Building Science Consortium

Pages/Volumes: 2 pp.

Publication Year: 2002

Notes: This publication was produced under Building America. Online at www.buildingscience.com.

Subject Category: Cold Climate

Document Type: Project Summaries

Abstract: Prairie Crossing was the first community-scale Building America project in the United States, opening in 1996. This cold-climate community is built with conservation of the environment in mind.

Report Number: 31671

[PDF 3.0 PDF](#)

Title: Built Green and Beyond . . . Stapleton homes will be a better buy

Author: Knott, M.

Source: The Stapleton Front Porch. Winter 2002

Pages/Volumes: pp. 3

Publication Year: 2002

Notes: Posted on this Web site with permission from Forest City Stapleton, Inc.

Subject Category: Cold Climate; Envelope and Window Systems; Heating Systems; Cooling Systems

Document Type: Magazine/Newspaper Articles

Abstract: Forest City's commitment to sustainable development at Stapleton includes a requirement that all of its homebuilders produce homes that meet or exceed the Built Green standards of the Home Builders Association of Metro Denver.

Report Numbers: 31934

[PDF 2.0 MB](#)

Title: Engle Homes leapfrogging the pack

Author: Andrews, S.

Source: HomeBuilder Magazine. Vol. 40(11) November 2001

Pages/Volumes: pp. 10, 33, 38

Publication Year: 2001

Notes: Posted on this Web site with permission of Home Builders Association of Metropolitan Denver.

Subject Category: Cold Climate

Document Type: Magazine/Newspaper Articles

Abstract: Forced-air HVAC systems are linked to a surprising number for comfort, health, safety, durability and energy-efficiency problems. Engle homes is moving their HVAC systems to the leading edge in the industry and will be testing every system to make sure it performs to their specifications.

Report Number: 32111

[PDF 1.0 MB](#)

Title: How Low Can You Go?

Author: Tanzer, V.

Source: Permanent Buildings and Foundations. July 1, 2001

Pages/Volumes: pp. 48

Publication Year: 2001

Notes: Posted on the Web site with permission from Permanent Buildings and Foundations magazine.

Subject Category: Cold Climate

Document Type: Magazine/Newspaper Articles

Abstract: Otto Van Geet of Idaho Springs, Colorado, has a 3,000-sq-ft concrete-block house that cost a mere \$100 for heating and power in 1999 in spite of the rough alpine climate.

Report Number: 32113

[PDF 188 KB](#)

Title: Cambridge Homes Increases Energy Efficiency in a Mix of Housing Types. Building America Project Summary Fact Sheet

Pages/Volumes: 2 pp.

Publication Year: 2001

Subject Category: Cold Climate

Document Type: Project Summaries

Abstract: New houses designed by Cambridge Homes in Crest Hill, Illinois, with technical support from the U.S. Department of Energy's Building America Program, save their homeowners money by applying the principles of "whole-building" design to the entire home product line. Regardless of the model chosen, homebuyers can enjoy consistently high levels of comfort and performance with the added benefit of reduced operating costs.

Report Number: FS-550-30459

[PDF 1.4 MB](#)

Title: The House as a System: Combustion Safety

Author: Andrews, S.

Source: HomeBuilder Magazine. January 2001

Pages/Volumes: pp. 16-32

Publication Year: 2001

Notes: Posted with permission from HomeBuilders Association of Metropolitan Denver.

Subject Category: Cold Climate; Heating Systems; Hot Water Systems

Document Type: Magazine/Newspaper Articles

Abstract: Along Colorado's Front Range, new home combustion appliances are assumed to be safe. However, exhaust systems are rarely tested for performance and safety. Between 1988 and 1996, 115 people died due to unintentional exposure to carbon monoxide, many others became sick. The safest solution is that "Only sealed-combustion, power-vented, induced-draft or direct-vented combustion appliances should be used for space conditioning and domestic hot water."

Report Number: JA-610-31046

[PDF 3.9 MB](#)

Title: Improved Framing and Ductwork Lower Energy Costs: McStain Enterprises, Longmont, CO. Building America Project Summary Fact Sheet

Pages/Volumes: 2 pp.

Publication Year: 2000

Subject Category: Cold Climate

Document Type: Project Summaries

Abstract: McStain Enterprises' new cottage-style homes built under the U.S. Department of Energy's Building America program are designed to greatly reduce energy costs and improve indoor air quality for their customers in Longmont, Colorado. In addition, energy-efficient features in the homes provide owners with greater durability and value, allow some buyers to

qualify for special energy-efficient mortgages, and can result in higher resale values. Features include improved building envelope and air distribution systems, high-efficiency heating and cooling systems, improved indoor air quality, Green Builder concepts from Colorado's Green Builder Program.

Report Number: FS-550-27208

PDF 212 KB

Title: Colorado Builder Joins Efficient Home Parade

Source: Frame Builder News. August 2000

Pages/Volumes: p.16

Editor: Stottrup, E., ed.

Publication Year: 2000

Notes: Posted with permission from Frame Builder News.

Subject Category: Cold Climate

Document Type: Magazine/Newspaper Articles

Abstract: Six new energy- and resource-efficient homes are being introduced into the Boulder, Colorado, market as part of a federal project to increase public access to integrated whole-building design.

Report Number: JA-610-31142

PDF 144 KB

Title: Prairie Crossing Homes. Office of Building Technology, State and Community Programs (BTS) Case Study (Brochure)

Pages/Volumes: 4 pp.

Publication Year: 1999

Subject Category: Cold Climate

Document Type: Project Summaries

Abstract: More than three hundred homes are being built in a northwest Chicago suburb that demonstrate the "whole house" design concept. The homes cost approximately the same as competitive houses of the same size but use approximately 50% less energy for heating and cooling.

Report Numbers: BR-330-26261; DOE/GO-10099-738

PDF 508 KB

Title: Ryan Homes and the Consortium for Advanced Residential Buildings. Building America Project Summary Fact Sheet.

Pages/Volumes: 2 pp.

Publication Year: 1999

Subject Category: Cold Climate

Document Type: Project Summaries

Abstract: Through Building America's unique collaboration process, Ryan Homes, the U.S. Department of Energy, the National Renewable Energy Laboratory, and the Consortium for Advanced Residential Buildings worked together to identify ways to incorporate money-saving energy features throughout the Carborne house.

Report Numbers: FS-810-26476; DOE/GO-10099-791

PDF 828 KB

Title: Developing a Better Shell for Lab House

Author: Holton, J. K.

Source: ASHRAE Journal. Vol. 39(11) November 1997

Pages/Volumes: pp. 56-59

Publication Year: 1997

Notes: The following article was published in ASHRAE Journal. Copyright 1997 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. This posting is by permission of ASHRAE, and is presented for educational purposes only. ASHRAE does not endorse or recommend commercial products or services. This article may not be copied and/or distributed electronically or in paper form without permission of ASHRAE. Contact ASHRAE at www.ashrae.org.

Subject Category: Envelope and Window Systems; Foundation Systems; Cold Climate; Performance Analysis and Tests

Document Type: Technical Reports

Abstract: The Residential Integrated Systems Application project is the initial effort of a home building research and development consortium consisting of building products manufacturers and

an A/E firm. The objective to develop methods to construct homes that are energy efficient, environmentally response, offer improved quality and are affordable.

Report Number: JA-610-30939

Cooling Systems

[PDF 370 KB](#)

Title: Modern Evaporative Coolers. Published in Home Energy Magazine.

Author: Kinney, L.

Pages/Volumes: 6 pp

Publication Year: 2004

Subject Category: Cold Climate; Hot-Dry Climate

Document Type: Magazine/Newspaper Articles

Abstract: Direct Drive Service, is a company in Colorado that specializes in efficient low-mass boilers--and high-efficiency evaporative coolers. This company installs coolers in the attics of large, site-built homes. The coolers pull in air from large gable vents, cool it by 30 degrees or so, and distribute it via several large ducts, typically to a hallway below. Cool air is directed by the patterns of window openings or by backdraft dampers, also known as up ducts, in the ceilings of rooms on the top story. The process is controlled by a multifunction thermostat that has the smarts to throttle back the fan speed when the setpoint temperature is about to be met, rinses out the reservoir to keep water and air clean, and partially automates much of the end-of-season maintenance.

Report Numbers: 38096

[PDF 6.2 MB](#)

Title: Builder System Performance Package Targeting 30% - 40% Savings in Space Conditioning Energy Use: Period of Performance; December 2002 to December 2003.

Pages/Volumes: 165 pp.

Publication Year: 2004

Notes: Work performed by Consortium for Advanced Residential Buildings, Norwalk, Connecticut.

Subject Category: Cost-Performance Tradeoffs

Document Type: Project Summaries

NTIS/GPO Number: 15008049

Abstract: The Consortium for Advanced Residential Building (CARB), one of the Building America teams, describes recommended best practices to achieve 30% - 40% energy savings without compromising health or safety in houses built in cold climates, hot-humid climates, and hot-dry climates.

Report Numbers: SR-550-34560

[PDF 911 KB](#)

Title: NREL's Advanced Thermal Conversion Laboratory at the Center for Buildings and Thermal Systems: On the Cutting-Edge of HVAC and CHP Technology.

Pages/Volumes: 4 pp.

Publication Year: 2004

Subject Category: Performance Analysis and Tests; Ventilation Systems; Cooling Systems; Heating Systems

Document Type: Bulletins

NTIS/GPO Number: 15007769

Abstract: This brochure describes how the unique testing capabilities of NREL's Advanced Thermal Conversion Laboratory at the Center For Buildings and Thermal Systems can help industry meet the challenge of developing the next generation of heating, ventilating, and air-conditioning (HVAC) and combined heat and power (CHP) equipment and concepts.

Report Numbers: BR-550-34928

No PDF

Title: Specification of Energy-Efficient Installation and Maintenance Practices for Residential HVAC Systems.

Author: Karg, R.; Krigger, J.

Pages/Volumes: 62 pp

Publication Year: 2000

Notes: Posted on this site with permission from Consortium for Energy Efficiency and can be found online at <http://www.cee1.org/resid/rs-ac/hvac.php3>.

Subject Category: Quality Control Tools; Cooling Systems; Heating Systems; Ventilation Systems

Document Type: Technical Reports

Abstract: On August 18, 2000, CEE rolled out its Residential HVAC Installation Specification. This 62-page document—the first of its kind—is a comprehensive guide to the selection, sizing, installation and maintenance of residential HVAC equipment. The focus is on maximizing the efficiency of these systems. CEE took two years to develop this specification, utilizing input from all facets of the HVAC industry. Trade associations, HVAC manufacturers and energy organizations all provided feedback during the development of the specification. Pacific Gas & Electric, Sacramento Municipal Utility District and the New York State Energy Research Development Authority (NYSERDA) co-funded development of the specification.

Report Numbers: 36120

[PDF 3.9 MB](#)

Title: HVAC Equipment Sizing Calcs.

Author: Andrews, S.

Pages/Volumes: 5 pp.

Publication Year: 2003

Notes: Posted on this site with permission from HomeBuilders magazine.

Subject Category: Cooling Systems

Document Type: Magazine/Newspaper Articles

Abstract: Sam Dardano, a Boulder-based code official who chairs the committee of statewide mechanical and plumbing inspectors, reports that by early next year roughly 75 percent of the building jurisdictions in Colorado will be operating under the International Codes. If that's true, here's a key item from the code that can help, not just hurt. The International Energy Conservation Code (IECC) requires that load calculations be used to size heating and cooling equipment. If properly implemented, this could reduce the widespread tendency to oversize equipment. Yet both builders and code officials are uncertain how to evaluate such calculations to assure the results are accurate. This article presents 10 top items to look for when evaluating HVAC sizing calcs.

Report Numbers: 34901

[PDF 139 KB](#)

Title: Heating and Cooling Equipment Selection. Office of Building Technology, State and Community Programs (BTS) Technology Fact Sheet

Pages/Volumes: 4 pp.

Publication Year: 2002

Subject Category: Cooling Systems; Heating Systems

Document Type: Bulletins

NTIS/GPO Number: 15000127

Abstract: This is one of a series of technology fact sheets created to help housing designers and builders adopt a whole-house design approach and energy efficient design practices. The fact sheet helps people choose the correct equipment for heating and cooling to reduce initial costs, increase homeowner comfort, increase operating efficiency, and greatly reduce utility costs.

Report Numbers: BR-810-26459; DOE/GO-102002-0779

[PDF 4.7 MB](#)

Title: Cost-Effective, Energy-Efficient Residence

Author: Griffiths, D.; Zoeller, W.

Source: ASHRAE Journal. April 2001

Pages/Volumes: pp. 56-58

Publication Year: 2001

Notes: Posted with permission from ASHRAE.

Subject Category: Hot-Humid Climate; Cooling Systems

Document Type: Project Summaries

Abstract: One of the goals of the Building America program, sponsored by the U.S. Department of Energy, is to produce energy-efficient environmentally sensitive, affordable and adaptable residences on a community scale. The Consortium for Advanced Residential Buildings (CARB) worked with one of America's largest production builders to develop a new innovative home, the Carbury. Its design and technical features can easily be applied on a community scale.

Report Number: JA-610-31113

Cost-Performance Tradeoffs

[PDF 188 KB](#)

Title: Elements of an Energy-Efficient House. Energy Efficiency and Renewable Energy Clearinghouse (EREC) Brochure

Pages/Volumes: 8 pp.

Publication Year: 2000

Subject Category: Cost-Performance Tradeoffs

Document Type: Bulletins

Abstract: A fact sheet that explains the elements of an energy-efficient house.

Report Numbers: 27835; DOE/GO-102000-1070

[PDF 140 KB](#)

Title: Energy Efficiency Pays: Systems Approach Cuts Home Energy Waste and Saves Money. Office of Building Technology, State and Community Programs (BTS) Technology Fact Sheet

Pages/Volumes: 4 pp.

Publication Year: 1999

Subject Category: Cost-Performance Tradeoffs

Document Type: Bulletins

Abstract: A fact sheet explaining the technology and benefits of energy efficient residential construction using the "whole building" approach.

Report Numbers: BR-330-26290; DOE/GO-10099-746

[PDF 420 KB](#)

Title: Building America: Cost Saving System Trade-Offs for Mixed Climates. Office of Building Technology, State and Community Programs (BTS) Case Study Fact Sheet

Pages/Volumes: 2 pp.

Publication Year: 1999

Subject Category: Cost-Performance Tradeoffs; Mixed-Dry Climate; System Engineering Research

Document Type: Project Summaries

Abstract: The project shown in this fact sheet uses "break points," where the cost of the energy-efficient features are balanced by the reductions of other construction costs. The goal of the Building America program is to produce energy efficient, environmentally sensitive, affordable, and adaptable residences on a community scale.

Report Number: FS-550-26536

[PDF 1.2 MB](#)

Title: Building America: Cost Saving System Trade-Offs for Hot Climates. Office of Building Technology, State and Community Programs (BTS) Case Study Fact Sheet

Pages/Volumes: 2 pp.

Publication Year: 1999

Subject Category: Hot-Dry Climate; Cost-Performance Tradeoffs; System Engineering Research

Document Type: Project Summaries

Abstract: This Building America fact sheet compares the energy performance of vented roofs versus unvented roofs and high performance windows versus conventional double glazed windows in homes in Tucson, Arizona. The houses are models in the Pulte Home Corporations' Retreat at the Bluffs housing development and have controlled mechanical ventilation to insure air exchange required for good indoor air quality. The design approach addresses the effect of air leakage in ductwork and air handlers in vented attics.

Report Number: FS-550-26884

[PDF 1.2 MB](#)

Title: Pulte Homes—Las Vegas, Nevada Cost-Saving System Trade-Offs for Hot, Dry Climates: Building America Project Summary (Fact sheet)

Pages/Volumes: 2 pp.

Publication Year: 1999

Subject Category: Cost-Performance Tradeoffs; Hot-Dry Climate

Document Type: Bulletins; Project Summaries

Abstract: Building America houses in Las Vegas, Nevada, are using state-of-the-art building materials and systems to provide residents with much lower energy bills than standard construction. The houses use unvented roofs, high-performance windows, and combo domestic hot-water and air-conditioning units.

Report Number: FS-550-27158

Envelope and Window Systems

No PDF

Title: Best Practices: Window Installation & Flashing Guidelines.

Author: IBACOS

Pages/Volumes: 2 pp.

Publication Year: 2003

Notes: Posted on this site with permission from IBACOS.

Subject Category: Envelope and Window Systems

Document Type: Design Guides

Abstract: Installing windows can be tricky. Try it without knowing how to do it right or skip a step, and you run into problems. At a minimum, the warranty will become invalid if the window isn't installed to the manufacturer's specifications. More seriously, if window flashing is not properly installed, rain water can leak behind the windows and enter walls. If wet building materials can't dry, moisture has the potential to seriously damage the home. Moisture intrusion can lead to mold growth, a cause of unhealthy indoor air. It can also lead to wood rot, which creates structural problems.

Report Numbers: 35381

[PDF 137 KB](#)

Title: Best Practices: Roof Flashing Guidelines.

Author: IBACOS

Pages/Volumes: 2 pp

Publication Year: 2003

Notes: Posted on this site with permission from IBACOS.

Subject Category: Envelope and Window Systems

Document Type: Bulletins

Abstract: The five illustrated steps in this document show the preferred method to ensure that these flashing techniques have been done properly on a home with any sort of lap siding (wood, engineered wood products, cement board, etc.). Following these steps will minimize the potential for water intrusion and contribute to a quality home. Planning for frequent inspections during construction to verify the proper sequence is being followed is also important to ensure proper implementation.

Report Numbers: 35850

No PDF

Title: Welcome to the High-Tech SIP Home with the Savings Built Right In - Consumer Brochure.

Author: Structural Insulated Panels (SIPA)

Pages/Volumes: 3 pp.

Publication Year: 2004

Notes: Abstract posted on this site with permission from Structural Insulated Panel Association and found at www.sips.org/publications/stuff.html.

Subject Category: Envelope and Window Systems

Document Type: Technical Reports

Abstract: A full-color, tri-fold brochure outlining the 7 ways to save with Structural Insulated Panels. Includes a place to insert company representative information. Available to SIPA Members only

Report Numbers: 35803

[No PDF](#)

Title: SIPA Technical Report—Juneau, Alaska, Roof Issue.

Author: Structural Insulated Panels Association (SIPA)

Publication Year: 2004

Notes: Posted on this site with permission from Structural Insulated Panel Association and is available at www.sips.org/publications/stuff.html.

Subject Category: Envelope and Window Systems; Cold Climate; Moisture Control

Document Type: Technical Reports

Abstract: This report summarizes the findings relating to the moisture damage of various SIP roof assemblies in Juneau, Alaska. The report is based on field evaluations, plans, specifications, photographs, local climate data, and engineering analysis.

Report Numbers: 35802

[No PDF](#)

Title: Side-by-Side Evaluation of a Stressed Skin Insulated Core Panel House and a Conventional Stud Frame House.

Author: Structural Insulated Panels Association (SIPA)

Publication Year: 2004

Notes: Posted on this site with permission from Structural Insulated Panel Association and can be found at www.sips.org/publications/stuff.html.

Subject Category: Envelope and Window Systems

Document Type: Technical Reports

Abstract: Side-by-side energy testing and monitoring was conducted on two houses in Louisville, KY, between January and March 1993. Both houses were identical except that one house was constructed with conventional 2x4 studs with a truss roof while the other house was constructed with structural insulated panels for the walls and second floor ceiling. This report, by the Florida Solar Energy Center, documents the superior energy performance of the panel house.

Report Numbers: 35801

[No PDF](#)

Title: Department of Energy Laboratory Shows New Way to Win the Energy Wars at Home.

Author: Structural Insulated Panels Association (SIPA)

Publication Year: 2004

Notes: Posted on this site with permission from Structural Insulated Panel Association and is available at www.sips.org/publications/stuff.html.

Subject Category: Envelope and Window Systems

Document Type: Bulletins

Abstract: When it comes to R-values, sometimes less can be more. That's the lesson from a careful comparison of wall systems carried out by energy experts at Oak Ridge National Laboratory (ORNL). In terms of real performance, an SIP wall rated at R-15 and only 4 inches thick actually outperforms a fiberglass insulated wall 6 inches thick and only 4 inches thick actually outperforms a fiberglass insulated wall 6 inches thick and rated on paper at R-19. ORNL test also demonstrates the inherent airtightness of SIP construction, showing it is 15 times more airtight than wood frame construction. This is a wonderful piece of literature to help you educate clients on the thermal efficiency of an SIP structure.

Report Numbers: 35799

[PDF 10 KB](#)

Title: Air Sealing: Quality Caulking and Sealing (Air Sealing) Contractor Scope of Work.

Author: ConSol Energy Consultants

Source: ComfortWise.

Pages/Volumes: 2 pp.

Publication Year: 2001

Notes: Posted on this site with permission from ConSol Energy Consultants.

Subject Category: Envelope and Window Systems

Document Type: Bulletins

Abstract: Airflow through cracks and holes in the walls, ceiling and floor is referred to as air infiltration. Air infiltration is minimized by caulking and sealing the envelope, usually performed by the insulation contractor. A home that is not sealed for air infiltration will be uncomfortable due to drafts and will use about 30% more energy than a relatively airtight home. Controlling air infiltration is one of the most cost-effective energy-efficiency measures in modern construction practices. In addition, good caulking and sealing will reduce dust and dirt that can enter homes through cracks and holes. Caulking and sealing is also one of the simplest energy-efficiency

measures to install.

Report Numbers: 35626

[**PDF 3.4 MB**](#)

Title: Best Practices: Window Installation & Flashing Guidelines.

Author: IBACOS

Pages/Volumes: 2 pp.

Publication Year: 2003

Notes: Posted on this site with permission from IBACOS.

Subject Category: Envelope and Window Systems

Document Type: Design Guides

Abstract: Installing windows can be tricky. Try it without knowing how to do it right or skip a step, and you run into problems. At a minimum, the warranty will become invalid if the window isn't installed to the manufacturer's specifications. More seriously, if window flashing is not properly installed, rain water can leak behind the windows and enter walls. If wet building materials can't dry, moisture has the potential to seriously damage the home. Moisture intrusion can lead to mold growth, a cause of unhealthy indoor air. It can also lead to wood rot, which creates structural problems.

Report Numbers: 35381

[**PDF 344 KB**](#)

Title: Best Practices: Optimum Value Engineering.

Author: IBACOS

Pages/Volumes: 2 pp.

Publication Year: 2002

Notes: Posted on this site with permission from IBACOS.

Subject Category: Envelope and Window Systems

Document Type: Bulletins

Abstract: New framing techniques and strategies have evolved that can improve a home's energy efficiency and durability, while reducing construction costs and maintaining structural integrity of the building. Optimum Value Engineering (OVE) describes these techniques.

Report Numbers: 35380

[**PDF 8.3 MB**](#)

Title: Portable Classroom Research Project Highlights Energy Efficiency.

Author: Baechler, M.; Gordon, A.

Source: Automated Builder Magazine. (386)

Pages/Volumes: 2 pp.

Publication Year: 2003

Notes: Posted on this site with permission from Automated Builder Magazine.

Subject Category: Envelope and Window Systems

Document Type: Magazine/Newspaper Articles

Abstract: Record numbers of students, demands for smaller class size, shrinking budgets, and growing infrastructure costs are spurring demand for portable classrooms in America's schools. Sixty-five percent of schools in the West report using portable classrooms; 36% nationwide do so. Over 180,000 students attend school in about 6,000 portables in the Northwest. New portable classroom installations are increasing at a rate of 5% per year. Nationally, the use of portable classrooms is expected to grow throughout the century.

Report Numbers: 34900

[**PDF 1.5 MB**](#)

Title: Building Performance...in Mixed-Humid Climates: IBACOS Quality Home Newsletter September 2002.

Author: IBACOS

Pages/Volumes: 6 pp.

Publication Year: 2002

Notes: Posted on this site with permission from IBACOS.

Subject Category: Envelope and Window Systems

Document Type: Bulletins

Abstract: About 88,000 homes are built every year in the Atlanta, Georgia, Washington D.C., and Raleigh-Greensboro, North Carolina markets. The climate in which these homes are built is hot and humid for half the year and experiences year-round thunderstorms, as well as winter storms. The weather in this climate zone can have harmful effects on building envelopes, so it's

important to plan for temperature, humidity, and rainfall in this mixed-humid climate zone.

Report Numbers: 34820

[**PDF 16.9 MB**](#)

Title: Green Building BSC-Style.

Author: Yost, P.

Source: Presented at 2002 State Energy Program/Rebuild America National Conference. July 29 to August 1, 2002

Pages/Volumes: 26 pp.

Publication Year: 2002

Notes: Posted on this site with permission from Building Science Consortium. Presented at 2002 State Energy Program/Rebuild America National Conference, July 29 to August 1, 2002.

Subject Category: Mixed-Humid Climate; Envelope and Window Systems

Document Type: Presentations

Abstract: A statement of the green building philosophy and methodology of the Building Science Consortium

Report Numbers: 33224

[**PDF 410 KB**](#)

Title: Building Testing and Monitoring at the Habitat/SIPA/APA Project in Plains, GA

Author: Rudd, A.

Pages/Volumes: 7 pp.

Publication Year: 2003

Notes: Posted on this site with permission from Building America Industrialized Housing Partnership.

Subject Category: Hot-Humid Climate; Envelope and Window Systems

Document Type: Project Summaries

Abstract: On 18-19 February 1998, two structural insulated panel (SIP) houses and one conventional 2x4 wood frame house were tested. The houses were all single-story, slab-on-grade, and similar in size (average 1100 ft²). They were constructed by the Sumter County Habitat for Humanity Affiliate, with some assistance on the SIP houses from the Structural Insulated Panel Association. For the wood frame house, all construction and energy related details remained as standard practice for the Habitat Affiliate. While all three houses showed good performance for building envelope and duct system airtightness, the SIP houses showed excellent performance. The SIP houses had blower door tested airtightness of 1.8 air changes per hour at -50 Pa compared to 3.9 for the conventional wood frame house. For each of the houses, a building audit was completed for the purpose of energy analysis for predicted peak heating and cooling load and annual energy consumption. With respect to the SIP houses, the frame house showed lower predicted annual space conditioning energy consumption but higher peak loads. The SIP houses had lower insulation values in the ceilings and walls than the frame house. However, the frame house had more window area and had its forced air ducts in the attic with a small amount of duct leakage to the outside. A home energy rating was also computed using REMRate. None of the houses met EPA/DOE Energy Star status primarily due to the uninsulated floor slab and electric resistance heat. Monitoring equipment for energy use and environmental conditions was installed but was not yet made operational due to lack of utility power at each house. We plan to monitor the houses from June 1998 through May 1999.

Report Number: 34808

[**PDF 2.3 MB**](#)

Title: Insulation

Author: Oak Ridge National Laboratory

Pages/Volumes: 24 pp.

Publication Year: 2002

Notes: Posted on this site with permission from Oak Ridge National Laboratory.

Subject Category: Envelope and Window Systems

Document Type: Design Guides

Abstract: Electricity bills, oil bills, gas bills—all homeowners pay for one or more of these utilities, and wish they paid less. Often many of us do not really know how to control or reduce our utility bills. We resign ourselves to high bills because we think that is the price we have to pay for a comfortable home. We encourage our children to turn off the lights and appliances, but may not recognize the benefits of insulating the attic. Unless your home was constructed with special attention to energy efficiency, adding insulation will probably reduce your utility bills.

Much of the existing housing stock in the United States is not insulated to the best level. Older homes are likely to use more energy than newer homes, leading to very high heating and air-conditioning bills. Even if you own a new home, adding insulation may save enough money in reduced utility bills to pay for itself within a few years, continue to save you money for as long as you own the home, and increase the resale value of your house.

Report Number: 34902

[PDF 78 KB](#)

Title: Quality Installation of Insulation: Contractor Scope of Work

Author: ConSol Energy Consultants

Pages/Volumes: 5 pp.

Publication Year: 1999

Notes: Posted on this Web site with permission from ConSol.

Subject Category: Envelope and Window Systems

Document Type: Design Guides

Abstract: The purpose of envelope insulation is to provide a continuous thermal barrier to minimize heat flow through the walls, ceiling and floor. Insulation serves to keep a home comfortable and reduce costs for heating and cooling. The home will not be as comfortable and energy costs will be increased if insufficient insulation is installed, or it is installed incorrectly, such as being compressed or installed with gaps. Furthermore, it is not difficult to install insulation correctly. Recent studies have found that over a third of new homes have lower levels of insulation installed than specified and an additional fifth have serious installation problems that will result in significantly decreased effectiveness of the insulation. In addition, virtually all of the homes studied were found to have numerous insulation installation defects that reduce the performance of the insulation well below its rated R-value. All of these problems can lead to defect litigation. These cost-effective procedures will improve comfort, reduce energy use, and reduce potential defect liability exposure. The purpose of this document is to provide the tools to ensure insulation is properly specified and installed, resulting in a comfortable, energy-efficient home.

Report Number: 34955

[PDF 78 KB](#)

Title: Standard Practice for Installation of Windows with Integral Mounting Flangae in Wood Frame Construction

Author: ConSol Energy Consultants

Pages/Volumes: 4 pp.

Publication Year: 1995

Notes: Posted on this site with permission from ConSol.

Subject Category: Envelope and Window Systems

Document Type: Bulletins

Abstract: This document discusses Standard Practice for Installation of Windows with Integral Mounting Flange in Wood Frame Construction

Report Numbers: 34956

[PDF 3.8 MB](#)

Title: Captain Planet Zero Energy SIPS Cottage

Author: Building Science Consortium

Pages/Volumes: 5 pp.

Notes: Posted on this site with permission from Building Science Consortium.

Subject Category: Onsite Power Systems; Envelope and Window Systems

Document Type: Project Summaries

Abstract: Energy Homes—energy self-sufficient, solar-powered homes; homes without utility bills, or nearly so. But you look at the utility bills for your own home and the cost of solar energy systems, and you wonder just how this can work. There are four essential ingredients to making a Zero Energy Home work: The Zero Energy Home is primarily powered by photovoltaic and solar hot water systems, both likely mounted on the roof. The Zero Energy Home is so efficient—as much as 90% more efficient than the average home—that demand for power can be met, or nearly met, with readily available and reasonably sized solar power systems. The Zero Energy Home always needs a backup—some energy from the grid in the case of the Cottage—to deal with times when the weather and the big energy demands (space heating or cooling, water heating, and refrigeration) combine and conspire. The fourth ingredient is you. To tread this lightly on the land requires that you are a part of the system, turning your energy use to

complement rather than stress the Zero Energy Home. This does not mean thermal privation or hand-cranking your radio—it means learning a lot about how your home works, occasionally outwitting the big energy demands, and maybe expanding your comfort zone just a bit. The trick is to stock your roof with panels; your home with the most efficient and integrated exterior envelope, HVAC system, water heater, appliances, and lighting available and your family with zero energy savvy. You will have to do all three. Here is what it takes to do each.

Report Numbers: 35016

[PDF 565 KB](#)

Title: Thermal Performance of Unvented Attics in Hot-Dry Climates: Results from Building America; Preprint

Author: Hendron, R.; Farrar-Nagy, S.; Anderson, R.; Reeves, P.; Hancock, E.

Pages/Volumes: 11 pp.

Publication Year: 2003

Notes: Prepared for the ISEC 2003: International Solar Energy Conference, 15-18 March 2003, Hawaii Island, Hawaii

Subject Category: Hot-Dry Climate; Envelope and Window Systems

Document Type: Technical Reports

NTIS/GPO Number: 15003044

Abstract: Unvented attics have become a more common design feature implemented by Building America partners in hot-dry climates of the United States. More attention is being focused on how this approach affects heating and cooling energy consumption. By eliminating the ridge and eave vents that circulate outside air through the attic and by moving the insulation from the attic floor to the underside of the roof, an unvented attic become a semi-conditioned space, creating a more benign environment for space conditioning ducts.

Report Number: CP-550-32827

[PDF 840 KB](#)

Title: Moisture Control for Buildings

Author: Lstiburek, J.

Source: ASHRAE Journal. Vol. 44(2) February 2002

Pages/Volumes: pp. 36-41

Publication Year: 2002

Notes: The following article was published by ASHRAE as part of the ASHRAE Journal (February 2002). © 2002 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. This posting is by permission of ASHRAE and is presented for educational purposes only. ASHRAE does not endorse or recommend commercial products or services. This article may not be copied and/or distributed electronically or in paper form without permission of ASHRAE. Contact ASHRAE at www.ashrae.org.

Subject Category: Moisture Control; Cold Climate; Hot-Humid Climate; Mixed-Humid Climate

Document Type: Technical Reports

Abstract: Moisture engineering uses an iterative and interdisciplinary systems approach to develop performance metrics to meet moisture-related objectives.

Report Number: 33288

[PDF 662 KB](#)

Title: Read This Before You Design, Build or Renovate

Author: Lstiburek, J.; Brennan, T.

Source: www.buildingscience.com.

Pages/Volumes: 28 pp.

Publication Year: 2001

Publisher, Place: Building Science Consortium

Notes: Posted on this Web site with permission from Building Science Consortium.

Subject Category: Envelope and Window Systems; Ventilation Systems; Cooling Systems; Affordable Housing

Document Type: Bulletins

Abstract: This document helps builders design, build or renovate homes, keeping in mind the issues of asthma, health, indoor air quality, dust, and living creatures.

Report Number: 32114

[PDF 705 KB](#)

Title: Roofs Reflect Better Savings

Author: Parker, D.; Sonne, J.

Source: Home Energy Magazine. July/August 2001

Pages/Volumes: pp. 24-26

Editor: Mary James, ed.

Publication Year: 2001

Notes: Posted on this Web site with permission from Home Energy Magazine, which is available on the web at www.homeenergy.org. This document may be obtained by emailing contact@homeenergy.org or by calling 510-524-5405.

Subject Category: Hot-Humid Climate; Envelope and Window Systems

Document Type: Magazine/Newspaper Articles

Abstract: Dramatic savings in cooling energy are possible with highly reflective roof systems.

Report Number: JA-610-31186

[PDF 392 KB](#)

Title: Thermal Performance Analysis of a High-Mass Residential Building (Preprint)

Author: Smith, M. W.; Torcellini, P. A.; Hayter, S. J.; Judkoff, R.

Pages/Volumes: 8 pp.

Publication Year: 2001

Notes: Prepared for the American Solar Energy Society (ASES) Forum 2001, 21-25 April 2001, Washington, DC

Subject Category: Envelope and Window Systems

Document Type: Technical Reports

Abstract: Minimizing energy consumption in residential buildings using passive solar strategies almost always calls for the efficient use of massive building materials combined with solar gain control and adequate insulation. Using computerized simulation tools to understand the interactions among all the elements facilitates designing low-energy houses. Finally, the design team must feel confident that these tools are providing realistic results. The design team for the residential building described in this paper relied on computerized design tools to determine building envelope features that would maximize the energy performance [1]. Orientation, overhang dimensions, insulation amounts, window characteristics and other strategies were analyzed to optimize performance in the Pueblo, Colorado, climate. After construction, the actual performance of the house was monitored using both short-term and long-term monitoring approaches to verify the simulation results and document performance. Calibrated computer simulations showed that this house consumes 56% less energy than would a similar theoretical house constructed to meet the minimum residential energy code requirements. This paper discusses this high-mass house and compares the expected energy performance, based on the computer simulations, versus actual energy performance.

Report Number: CP-550-29537

[PDF 1.7 MB](#)

Title: Analysis of the Thermal Performance of Tierra I—A Low-Energy High-Mass Residence

Author: Smith, M. W.

Pages/Volumes: 89 pp.

Publication Year: 2001

Subject Category: Envelope and Window Systems

Document Type: Technical Reports

Abstract: A low-energy concrete house was designed using passive solar strategies to consume 70% less heating and cooling energy than a base case that conformed to the 1996 Home Energy Rating System (HERS) and the 1995 Model Energy Code (MEC). The performance of this house was then evaluated using computer simulations and measured data. The house, Tierra I, was monitored from July 22, 1996, through October 14, 1997. A Short Term Energy Monitoring (STEM) test was done November 19 to December 10, 1996. Computer simulations of the house were done using SUNREL, an updated version of the hourly data simulation package SERI-RES. The SUNREL model of the house was calibrated using both short- and long-term data. The house achieved energy savings of 56%, below the goal of 70%. The lower than expected savings resulted from problems with the window modeling. As a result, during the design phase the solar gains were overestimated causing an underestimate in the level of insulation necessary to achieve the savings goal. For very low-energy passive solar buildings, it is apparent that very accurate window modeling is required. It also became apparent that accurate ground models are required as well because ground-heat loss accounts for a significant portion of the total heat loss in low-energy buildings.

Report Number: TP-550-25873

No PDF

Title: "Behind the Walls" House Demonstrates SIPs at the 2001 International Builders' Show
Author: Wachtler, B.
Source: OnSite@SIPA. SIPA Structural Insulated Panel Association. January/February 2001
Pages/Volumes: 2 pp.
Publication Year: 2001
Notes: Posted on this Web site with permission from the Structural Insulated Panel Association.
Subject Category: Envelope and Window Systems
Document Type: Program Summaries; Magazine/Newspaper Articles
Abstract: For the fifth consecutive year, SIPA leads the construction effort to build a demonstration house showing advanced wood products, building systems, and proper building practices at the International Builders Show in Atlanta, Georgia.
Report Number: 30976

[PDF 1.8 MB](#)

Title: Attic Access: Office of Building Technology, State and Community Programs (BTS) Fact Sheet
Pages/Volumes: 4 pp.
Publication Year: 2000
Subject Category: Envelope and Window Systems
Document Type: Bulletins
Abstract: Technology fact sheet on installing insulation coverage and air sealing for the access between living space and the unconditioned attic.
Report Numbers: 26447; DOE/GO-102000-0768

[PDF 1.8 MB](#)

Title: Ceilings and Attics: Office of Building Technology, State and Community Programs (BTS) Fact Sheet
Pages/Volumes: 4 pp.
Publication Year: 2000
Subject Category: Envelope and Window Systems
Document Type: Bulletins
Abstract: Technology fact sheet on installing insulation and providing ventilation through ceilings and attics
Report Numbers: 26450; DOE/GO-102000-0771

[PDF 262 KB](#)

Title: Air Sealing: Seal Air Leaks and Save Energy! Office of Building Technology, State and Community Programs (BTS) Fact Sheet
Pages/Volumes: 4 pp.
Publication Year: 2000
Subject Category: Envelope and Window Systems
Document Type: Bulletins
Abstract: Technology fact sheet on sealing air leaks to save energy in your home.
Report Numbers: BR-810-26446; DOE/GO-102000-0767

[PDF 859 KB](#)

Title: Window Industry Technology Roadmap: Office of Building Technology, State and Community Programs (BTS) Brochure
Pages/Volumes: 23 pp.
Publication Year: 2000
Subject Category: Envelope and Window Systems
Document Type: Strategic Plans
Abstract: Technology roadmap describing technology vision, barriers, and RD&D goals and strategies compiled by window industry stakeholders and government agencies.
Report Numbers: BR-810-27994; DOE/GO-102000-0980

[PDF 794 KB](#)

Title: Advanced Wall Framing. Office of Building Technology, State and Community Programs (BTS) Technology Fact Sheet
Pages/Volumes: 6 pp.
Publication Year: 2000
Subject Category: Envelope and Window Systems
Document Type: Bulletins

Abstract: Advanced framing techniques for home construction have been researched extensively and proven effective. Both builders and homeowners can benefit from advanced framing. Advanced framing techniques create a structurally sound home that has lower material and labor costs than a conventionally framed house. This fact sheet describes advanced framing techniques, design considerations, and framing.

Report Numbers: FS-810-26449; DOE/GO-102000-0770

[**PDF 765 KB**](#)

Title: Wall Insulation. Office of Building Technology, State and Community Programs (BTS) Technology Fact Sheet

Pages/Volumes: 4 pp.

Publication Year: 2000

Subject Category: Envelope and Window Systems

Document Type: Bulletins

Abstract: Fact sheet for homeowners and contractors on how to provide moisture control and insulation in wall systems.

Report Numbers: FS-810-26451; DOE/GO-102000-0772

[**PDF 223 KB**](#)

Title: Weather-Resistive Barriers. Office of Building Technology, State and Community Programs (BTS) Fact Sheet

Pages/Volumes: 4 pp.

Publication Year: 2000

Subject Category: Envelope and Window Systems

Document Type: Bulletins

Abstract: Fact sheet for homeowners and contractors on how to select housewrap and other types of weather-resistive barriers.

Report Numbers: FS-810-28600; DOE/GO-102000-0769

[**PDF 1.3 MB**](#)

Title: Vented and Sealed Attics in Hot Climates

Author: Rudd, A. F.; Lstiburek, J. W.

Source: ASHRAE Transactions. Vol. 104(2) 1998

Pages/Volumes: pp. 1199-1210

Publication Year: 1998

Notes: The following article was published in ASHRAE Transactions. Copyright 1997 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. This posting is by permission of ASHRAE and is presented for educational purposes only. ASHRAE does not endorse or recommend commercial products or services. This article may not be copied and/or distributed electronically or in paper form without permission of ASHRAE. Contact ASHRAE at www.ashrae.org.

Subject Category: Envelope and Window Systems

Document Type: Technical Reports

Abstract: Sealed attic construction, by excluding vents to the exterior, can be a good way to exclude moisture-laden outside air from attics and may offer a more easily constructed alternative for air leakage control at the top of residential buildings. This study showed that, when compared to typically vented attics with the air distribution ducts present, sealed "cathedralized" attics (i.e., sealed attic with the air barrier and thermal barrier (insulation) at the sloped roof plane) can be constructed without an associated energy penalty in hot climates.

Report Number: JA-610-30938

[**PDF 2.7 MB**](#)

Title: Measurement of Attic Temperatures and Cooling Energy Use in Vented and Sealed Attics in Las Vegas, Nevada.

Author: Rudd, A. F.; Lstiburek, J. W.; Moyer, N. A.

Source: EEBA Excellence, The Journal of the Energy Efficient Building Association. Proceedings of the 14th Annual Excellence in Building Conference, 14-17 November 1996, Minneapolis, Minnesota.

Pages/Volumes: 6 pp.

Publication Year: 1996

Notes: Posted with permission from the Energy Efficient Building Association.

Subject Category: Envelope and Window Systems

Document Type: Technical Reports

Abstract: A study consisting of computer modeling and on-site experiments is conducted to determine the usefulness of attic vents. The question is raised of whether they are truly necessary.

Report Number: JA-610-30974

Foundation Systems

[PDF 104 KB](#)

Title: Best Practices: Don't Forget About the Basement.

Pages/Volumes: 2 pp.

Publication Year: 2002

Notes: Posted on this site with permission from IBACOS.

Subject Category: Foundation Systems

Document Type: Bulletins

Abstract: If you live in a home with a basement, you know how valuable that space is—whether you store boxes of keepsakes and clothing, or utilize the space for projects or living space. Chances are your basement is also cold, damp, and/or musty. We all simply accept this, mopping up after rainstorms and creating raised spaces for storage, but it's not a necessary condition. Consider this in the homes that you build, as well as the one you live in. The key to a livable basement (rather than one where things like to live) is applying appropriate methods to insulate the walls, control moisture, and to heat and cool the space.

Report Numbers: 35398

[PDF 115 KB](#)

Title: Best Practices: Consider the Crawl Space.

Author: IBACOS

Pages/Volumes: 2 pp.

Publication Year: 2002

Notes: Posted on this site with permission from IBACOS.

Subject Category: Foundation Systems

Document Type: Design Guides

Abstract: Though homeowners rarely think about that small space under their houses, builders should give crawlspaces careful consideration. Some of the most common—and damaging—building problems stem from moisture in crawlspaces. Poorly constructed crawlspaces can contribute to mold problems, indoor air problems, and inefficient operation of the home's mechanical equipment. Carefully considering design and construction of crawlspaces, as part of an overall quality construction strategy, can reduce problems for both builders and homeowners.

Report Numbers: 35379

[PDF 2.1 MB](#)

Title: Model for Ground-Coupled Heat and Moisture Transfer from Buildings

Author: Deru, M.

Pages/Volumes: 153 pp.

Publication Year: 2003

Subject Category: Foundation Systems

Document Type: Technical Reports

NTIS/GPO Number: 15004062

Abstract: An important factor in soil heat transfer that is often over looked is the effect of moisture, which can vary the effective thermal conductivity by a factor of ten. The objective of this research was to investigate the ground-coupled heat and moisture transfer from buildings, and to develop results and tools to improve energy simulation of ground-coupled heat transfer.

Report Number: TP-550-33954

[PDF 190 KB](#)

Title: Basement Insulation. Office of Building Technology, State and Community Programs (BTS) Technology Fact Sheet

Pages/Volumes: 4 pp.

Publication Year: 2002

Subject Category: Foundation Systems

Document Type: Bulletins

NTIS/GPO Number: 15000126

Abstract: This is one of a series of technology fact sheets created to help housing designers and builders adopt a whole-house design approach and energy efficient design practices. The fact

sheet advises how to create a comfortable basement environment that is free of moisture problems and easy to condition.

Report Numbers: BR-810-26455; DOE/GO-102002-0776

[PDF 721 KB](#)

Title: Basement Insulation Systems

Author: Yost, N.; Lstiburek, J.

Pages/Volumes: 20 pp.

Publication Year: 2002

Notes: Posted on this site with permission from Building Science Consortium.

Subject Category: Moisture Control; Foundation Systems

Document Type: Technical Reports

Abstract: Meeting Energy Star levels of performance is one of the criteria for constructing homes to Building America levels of performance—levels defined by the Building Science Consortium and others. Homes constructed with basements require some degree of basement insulation to meet Energy Star. As a result all Building America homes with basements constructed by the Building Science Consortium have basement insulation.

Report Number: 35017

[PDF 692 KB](#)

Title: Let's Talk About ... Comfort

Author: Hunt, S.

Source: Quality Home. July 2002

Pages/Volumes: 6 pp.

Publication Year: 2002

Notes: Posted with permission from IBACOS.

Subject Category: Foundation Systems

Document Type: Bulletins

Abstract: Bi-monthly newsletter from IBACOS that focuses on construction quality. This issue deals specifically with thermal comfort.

Report Number: 33183

[PDF 458 KB](#)

Title: Let's Talk About ... Moisture & Mold

Author: Hunt, S.

Source: Quality Home. April 2002

Pages/Volumes: 6 pp.

Publication Year: 2002

Notes: Posted with permission from IBACOS.

Subject Category: Moisture Control; Ventilation Systems; Foundation Systems; Humidity Control Systems

Document Type: Bulletins

Abstract: Bi-monthly newsletter from IBACOS that focuses on construction quality. This issue deals specifically with moisture and mold.

Report Number: 33182

[PDF 665 KB](#)

Title: Ground-Coupled Heat and Moisture Transfer from Buildings; Part 1: Analysis and Modeling (Preprint).

Author: Deru, M. P.; Kirkpatrick, A. T.

Pages/Volumes: 12 pp.

Publication Year: 2001

Notes: Prepared for the American Solar Energy Society (ASES) National Solar Conferences Forum 2001, 21-25 April 2001, Washington, DC

Subject Category: Foundation Systems

Document Type: Technical Reports

Abstract: Ground-heat transfer is tightly coupled with soil-moisture transfer. The coupling is threefold: heat is transferred by thermal conduction and by moisture transfer; the thermal properties of soil are strong functions of the moisture content; and moisture phase change includes latent heat effects and changes in thermal and hydraulic properties. A heat and moisture transfer model was developed to study the ground-coupled heat and moisture transfer from buildings. The model also includes detailed considerations of the atmospheric boundary conditions, including precipitation. Solutions for the soil temperature distribution are obtained

using a finite element procedure. The model compared well with the seasonal variation of measured ground temperatures.

Report Number: CP-550-29693

[**PDF 583 KB**](#)

Title: Ground-Coupled Heat and Moisture Transfer from Buildings; Part 2: Application (Preprint).

Author: Deru, M. P.; Kirkpatrick, A. T.

Pages/Volumes: 10 pp.

Publication Year: 2001

Notes: Prepared for the American Solar Energy Society (ASES) National Solar Conferences Forum 2001, 21-25 April 2001, Washington, DC

Subject Category: Foundation Systems

Document Type: Technical Reports

Abstract: In this paper the effects of moisture on the heat transfer from two basic types of building foundations, a slab-on-grade and a basement, are examined. A two-dimensional finite element heat and moisture transfer program is used to show the effects of precipitation, soil type, foundation insulation, water table depth, and freezing on the heat transfer from the building foundation. Comparisons are made with a simple heat conduction model to illustrate the dependency of the soil thermal conductivity on moisture content.

Report Number: CP-550-29694

[**PDF 218 KB**](#)

Title: Slab Insulation. Office of Building Technology, State and Community Programs (BTS) Technology Fact Sheet

Pages/Volumes: 4 pp.

Publication Year: 2000

Subject Category: Foundation Systems

Document Type: Bulletins

Abstract: This fact sheet for homeowners and contractors discusses how to insulate slab-on-grade floors and control moisture, air leakage, termites, and radon.

Report Numbers: BR-810-29237; DOE/GO-102000-0775

[**PDF 235 KB**](#)

Title: Crawlspace Insulation. Office of Building Technology, State and Community Programs (BTS) Technology Fact Sheet

Pages/Volumes: 4 pp.

Publication Year: 2000

Subject Category: Foundation Systems

Document Type: Bulletins

Abstract: This fact sheet for homeowners and contractors contains information on how to manage moisture in the crawlspace, insulate crawlspace walls, insulate underflooring, handle ventilation, and manage radon.

Report Numbers: BR-810-29238; DOE/GO-102000-0774

Heating Systems

[**PDF 397 KB**](#)

Title: Designing and Installing Solar Water Heating Systems. Published in Home Energy Magazine.

Author: Kent, J.; Rittelmann, B.

Pages/Volumes: 7 pp

Publication Year: 2004

Subject Category: Cooling Systems; Hot-Dry Climate

Document Type: Magazine/Newspaper Articles

Abstract: In the Community of Civano, on top of garages and homes, dark, rectangular boxes bask in the Arizona sun. They are integral collector storage (ICS) panels, facing south and tilted at 35 degrees up from horizontal to harness solar power to heat the home's domestic water supply. Homes in Civano's sustainable community, surrounded by the Southwest's signature wrinkled, brown mountains, are required by the community's energy standards to be energy and water efficient, and with a particular emphasis on the use of solar energy. These solar water-heating systems are helping the homes they are perched on to meet the community's efficiency standards—most of the time. However, in some poorly designed systems the fraction of the total energy required for heating water that was provided by solar energy is almost zero.

Report Numbers: 38097

[PDF 1.0 MB](#)

Title: Best Practices Guide for Residential HVAC Retrofits.

Pages/Volumes: 33 pp.

Publication Year: 2004

Subject Category: Retrofit Research

Document Type: Technical Reports

Abstract: This best practices guide for residential HVAC system retrofits is aimed at contractors who want guidance on delivering energy efficient, cost effective and innovative products. It has been developed around the idea of having packages of changes to the building HVAC system and building envelope that are climate and house construction dependent. These packages include materials, procedures and equipment and are designed to remove some of the guesswork from a builder, contractor, installer or homeowner decision about how best to carry out HVAC changes.

Report Numbers: 37801

[PDF 12.8 MB](#)

Title: Trombe Walls in Low-Energy Buildings: Practical Experiences; Preprint.

Author: Torcellini, P.; Pless, S.

Pages/Volumes: 8 pp.

Publication Year: 2004

Notes: Prepared for the World Renewable Energy Congress VIII, 29 August - 3 September 2004, Denver, Colorado

Subject Category: Onsite Power Systems

Document Type: Technical Reports

NTIS/GPO Number: 15009462

Abstract: Low-energy buildings today improve on passive solar design by incorporating a thermal storage and delivery system called a Trombe wall. Trombe walls were integrated into the envelope of a recently completed Visitor Center at Zion National Park and a site entrance building at the National Wind Technology Center located at the National Renewable Energy Laboratory. NREL helped to design these commercial buildings to minimize energy consumption, using Trombe walls as an integral part of their design.

Report Numbers: CP-550-36277

[PDF 670 KB](#)

Title: Biodiesel Blends in Space Heating Equipment: January 31, 2001 - September 28, 2001.

Author: Krishna, C. R.

Pages/Volumes: 32 pp.

Publication Year: 2004

Notes: Work performed by Brookhaven National Laboratory, Upton, New York.

Subject Category: Heating Systems

Document Type: Technical Reports

NTIS/GPO Number: 15009675

Abstract: This report documents an evaluation of the performance of blends of biodiesel and home heating oil in space heating applications.

Report Numbers: SR-510-33579

[PDF 12.8 MB](#)

Title: Better Duct Systems for Home Heating and Cooling.

Author: Andrews, J.

Pages/Volumes: 7 pp

Publication Year: 2001

Subject Category: Heating Systems; Cooling Systems

Document Type: Design Guides

Abstract: This publication is a series of six guides intended to provide a working knowledge of residential heating and cooling duct systems, an understanding of the major issues concerning efficiency, comfort, health, and safety, and practical tips on installation and repair of duct systems. These guides are intended for use by contractors, system designers, advanced technicians, and other HVAC professionals. The first two guides are also intended to be accessible to the general reader.

Report Numbers: 34122

[PDF 181 KB](#)

Title: Right-Size Heating and Cooling Equipment. Office of Building Technology, State and Community Programs (BTS) Technology Fact Sheet

Pages/Volumes: 4 pp.

Publication Year: 2002

Subject Category: Heating Systems; Cooling Systems

Document Type: Bulletins

NTIS/GPO Number: 15000207

Abstract: This is one of a series of technology fact sheets created to help housing designers and builders adopt a whole-house design approach and energy efficient design practices. The fact sheet helps people choose the correct equipment size for heating and cooling to improve comfort and reduce costs, maintenance, and energy use.

Report Numbers: BR-810-31318; DOE/GO-102002-1490

[PDF 1.2 MB](#)

Title: Improving the Efficiency of Your Duct System (Revised)

Pages/Volumes: 15 pp.

Publication Year: 1999

Subject Category: Heating Systems; Cooling Systems

Document Type: Bulletins

Abstract: The duct system, used in air heating and air cooling your home, is a collection of tubes that distributes the heated or cooled air to the various rooms. The duct system can have an important effect on health of the occupants through the distribution of indoor air pollution. Changes and repairs to a duct system should always be performed by a qualified professional. This brochure is meant to help you understand the problems that can affect the duct system and how you can save money, improve comfort, and protect against potential health hazards.

Report Numbers: 27630; DOE/EE0109

[PDF 13.3 MB](#)

Title: Biting the 90 AFUE Bullet

Author: Andrews, S.

Source: HomeBuilder Magazine. Vol. 42(7) July 2003

Pages/Volumes: pp. 11, 13, 15, 30

Publication Year: 2003

Notes: Posted on this site with permission from HomeBuilders Association of Metropolitan Denver.

Subject Category: Heating Systems

Document Type: Magazine/Newspaper Articles

Abstract: Not long ago, energy rater Steve Byers reported that a 200-homes-per-year Front Range builder wanted to qualify for the EPA's Energy Star performance threshold. Their pivotal question to him: did they have to step up to a 90 percent efficient furnace to do this? In most cases the answer is "yes." Yet, due to systems benefits, there are other reasons to make this switch. And thanks to rising prices for natural gas, the 90 percent efficient furnace is cost-effective in most new homes today.

Report Number: 35005

[PDF 401 KB](#)

Title: Gustafson cheers Engle's HVAC challenge

Author: Andrews, S.

Source: HomeBuilder Magazine. Vol. 40(12) December 2001

Pages/Volumes: pp. 10, 12, 15, 33

Publication Year: 2001

Notes: Posted on this Web site with permission from HomeBuilders Association of Metropolitan Denver.

Subject Category: Heating Systems; Cooling Systems; Cold Climate

Document Type: Magazine/Newspaper Articles

Abstract: Engle Homes of Colorado, with consultant Rob DeKieffer (Boulder Design Alliance), met several times with the five HVAC companies that installed their systems. They demonstrated in the field, the critical problems tied to today's HVAC installation, offered their preliminary list of recommendations and then asked, "What do you think?"

Report Numbers: 32110

[PDF 501 KB](#)

Title: Whole-Building Energy Simulation with a Three-Dimensional Ground-Coupled Heat Transfer Model: Preprint

Author: Deru, M.; Judkoff, R.; Neymark, J.

Pages/Volumes: 18 pp.

Publication Year: 2002

Notes: Prepared for the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE) Winter Meeting, 25-29 January 2003, Chicago, Illinois.

Subject Category: Performance Analysis and Tests; Heating Systems

Document Type: Technical Reports

NTIS/GPO Number: 15000848

Abstract: A three-dimensional, finite-element, heat-transfer computer program was developed to study ground-coupled heat transfer from buildings. It was used in conjunction with the SUNREL whole-building energy simulation program to analyze ground-coupled heat transfer from buildings, and the results were compared with the simple ground-coupled heat transfer models used in whole-building energy simulation programs. The detailed model provides another method of testing and refining the simple models and analyzing complex problems. This work is part of an effort to improve the analysis of the ground-coupled heat transfer in building energy simulation programs. The output from this detailed model and several others will form a set of reference results for use with the BESTEST diagnostic procedure. We anticipate that the results from the work will be incorporated into ANSI/ASHRAE 140-2001, Standard Method of Test for the Evaluation of Building Energy Analysis Computer Programs.

Report Numbers: CP-550-32690

Hot-Dry Climate

[PDF 5.8 MB](#)

Title: Building America Best Practices Series: Volume 2. Builders and Buyers Handbook for Improving New Home Efficiency, Comfort, and Durability in the Hot-Dry and Mixed-Dry Climates.

Author: Baechler, M. C.; Taylor, Z. T.; Bartlett, R.; Gilbride, T.; Hefty, M.; Love, P. M.

Pages/Volumes: 122 pp.

Publication Year: 2005

Subject Category: Hot-Dry Climate; Cold Climate; Mixed-Humid Climate

Document Type: Technical Reports

NTIS/GPO Number: 15016298

Abstract: This best practices guide is part of a series produced by Building America. The guidebook is a resource to help builders large and small build high-quality, energy-efficient homes that achieve 30% energy savings in space conditioning and water heating in the hot-dry and mixed-dry climates. The savings are in comparison with the 1993 Model Energy Code. The guide contains chapters for every member of the builder's team-from the manager to the site planner to the designers, site supervisors, the trades, and marketers. There is also a chapter for homeowners on how to use the book to provide help in selecting a new home or builder.

Report Numbers: TP-550-37643

No PDF

Title: Thermal Performance of Unvented Attics in Hot-Dry Climates: Results from Building America.

Author: Hendron, R.; Farrar-Nagy, S.; Anderson, R.; Reeves, P.; Hancock, E.

Source: Journal of Solar Energy Engineering. Transactions of the ASME. Vol. 126 May 2004

Pages/Volumes: pp. 732-737

Publication Year: 2004

Notes: For preprint version including online full-text document, see NREL/CP-550-32827.

Subject Category: Hot-Dry Climate; Envelope and Window Systems

Document Type: Technical Reports

Report Numbers: JA-550-36448

No PDF

Title: Thermal Performance of Unvented Attics in Hot-Dry Climates: Results from Building America
Author: Hendron, R.; Farrar-Nagy, S.; Anderson, R.; Reeves, P.; Hancock, E.
Source: Proceedings of the ISEC 2003: International Solar Energy Conference, 15-18 March 2003, Kohala Coast, Hawaii.
Pages/Volumes: pp. 73-80
Publication Year: 2003
Publisher, Place: New York: American Society of Mechanical Engineers
Notes: For preprint version, including full text online document, see NREL/CP-550-32827.
Subject Category: Hot-Dry Climate; Envelope and Window Systems
Document Type: Technical Reports
Report Number: CP-550-34737

PDF 918 KB

Title: Copper Moon, Pulte Homes, Tucson, Arizona
Source: Building Science Consortium.
Pages/Volumes: 1 pp.
Publication Year: 2002
Notes: This publication is a Building America project. Online at www.buildingscience.com.
Subject Category: Hot-Dry Climate
Document Type: Project Summaries
Abstract: Pulte Homes of Tucson, Arizona, has more than 90% customer satisfaction in their energy-efficient homes. For Pulte, these Building America houses achieved the 2001 Energy Value in Housing Award (EVHA) Builder of the Year.
Report Number: 31674

PDF 1.3 MB

Title: Cinco Ranch, Pulte Homes, Houston, Texas
Source: Building Science Consortium.
Pages/Volumes: 1 pp.
Publication Year: 2002
Notes: This publication is a Building America project. Online at www.buildingscience.com.
Subject Category: Hot-Dry Climate
Document Type: Project Summaries
Abstract: Pulte-Houston began constructing Building America prototype houses in late 2000. They have overcome many challenges to now produce outstanding energy-efficient homes.
Report Number: 31675

PDF 2.7 MB

Title: Strosnider builds high-tech classic
Author: Sanchez, L.
Source: Su Casa. Autumn 2001
Pages/Volumes: pp. 40-43
Publication Year: 2001
Notes: Posted on this Web site with permission from Su Casa magazine.
Subject Category: Hot-Dry Climate; Cooling Systems
Document Type: Project Summaries
Abstract: The Strosnider family has 65 years of experience building in Albuquerque. Their featured house in this year's Homes of Enchantment Parade is one of the first custom homes in Albuquerque certified by the Building America Program.
Report Number: 32112

PDF 183 KB

Title: Systems Engineering Saves Energy in Southwest: Pulte Homes—Tucson, Arizona. Building America Project Summary Hot/Dry Climate (Fact Sheet).
Pages/Volumes: 2 pp.
Publication Year: 2002
Subject Category: Hot-Dry Climate
Document Type: Project Summaries
NTIS/GPO Number: 15000364
Abstract: Houses being built in Tucson, Arizona, by Pulte Homes are part of the U.S. Department of Energy Building America program. These homes reduce electric air-conditioning bill and gas-heating bills by 30-50% relative to the 1995 Model Energy Code.

Report Number: FS-550-31701

[**PDF 911 KB**](#)

Title: New American Home: Las Vegas, Nevada—2003. Office of Energy Efficiency and Renewable Energy, Building Technologies Program Brochure.

Pages/Volumes: 4 pp.

Publication Year: 2002

Subject Category: Hot-Dry Climate

Document Type: Project Summaries

NTIS/GPO Number: 15002486

Abstract: The New American Home is an annual showcase project designed by committee and co-sponsored by the National Association of Home Builder's National Council of the Housing Industry (NCHI) and Builder Magazine. This year it was a building project for Amland Development.

Report Number: BR-550-32944

[**PDF 180 KB**](#)

Title: State-of-the-Art Building Concepts Lower Energy Bills: Pulte Homes — Las Vegas, Nevada. Building America Project Summary Fact Sheet.

Pages/Volumes: 2 pp.

Publication Year: 2002

Subject Category: Hot-Dry Climate

Document Type: Project Summaries

NTIS/GPO Number: 15000368

Abstract: Houses built by Pulte Homes as part of the U.S. Department of Energy's Building America program in Las Vegas, Nevada, save money for the home owners by reducing electric air-conditioning costs and gas heating costs with little or no additional investment.

Report Number: FS-550-31793

[**PDF 1.2 MB**](#)

Title: Thermal Performance of Unvented Attics in Hot-Dry Climates

Author: Hendron, B.; Anderson, R.; Reeves, P.; Hancock, E.

Pages/Volumes: 58 pp.

Publication Year: 2002

Subject Category: Hot-Dry Climate

Document Type: Technical Reports

NTIS/GPO Number: 15000301

Abstract: As unvented attics become a more common design feature implemented by Building America partners in hot-dry climates of the United States, more attention has been focused on how this approach affects heating and cooling energy consumption. The National Renewable Energy Laboratory (NREL) has conducted field testing and hourly building simulations for several Building America projects to evaluate energy use in vented and unvented attics in hot-dry climates. In summer, testing of the Las Vegas prototype house demonstrated that the thermal performance of an unvented attic is highly dependent on duct leakage.

Report Number: TP-550-30839

[**PDF 429 KB**](#)

Title: Impacts of Shading and Glazing Combinations on Residential Energy Use in a Hot Dry Climate

Author: Farrar-Nagy, S.; Anderson, R.; Hancock, C. E.; Reeves, P.

Pages/Volumes: 17 pp.

Publication Year: 2000

Notes: Prepared for the 2000 ACEEE Summer Study on Energy Efficiency in Buildings, 20-25 August 2000, Pacific Grove, California

Subject Category: Hot-Dry Climate

Document Type: Technical Reports

Abstract: A residential building in Tucson, Arizona, was studied to evaluate opportunities for reducing cooling energy use in a hot dry climate. The reduction of solar heat gain was strongly influenced by spectrally selective windows, architectural shading, and site shading from adjacent buildings. The study emphasized accurately modeling these features to account for effects on the energy load. Building performance was modeled using a detailed hourly energy simulation tool and was measured while unoccupied for a period of 12 days. Model inputs included direct measurements of the net air exchange rate, surface reflectance, and window transmittance.

Model results showed good agreement with the direct measurements of cooling loads and air-conditioning energy use. A parametric study of annual energy use is presented showing the impacts of glazing type, architectural shading, site shading, and building orientation. It is important to understand these interactions to optimize energy savings in community-scale housing developments.

Report Number: CP-550-28203

[PDF 211 KB](#)

Title: New Building Approach Saves Energy and Cost: Retreat at the Bluffs Prototype, Pulte Homes, Tucson, Arizona. Building America Project Summary Fact Sheet

Pages/Volumes: 2 pp.

Publication Year: 2000

Subject Category: Hot-Dry Climate

Document Type: Project Summaries

Abstract: An innovative prototype house built by Pulte Homes as part of the U.S. Department of Energy's Building America program in Tucson, Arizona, saves money for the homeowner by reducing electric air-conditioning costs and gas-heating costs with little or no additional investment.

Report Number: FS-550-28576

(No PDF)

Title: System Interactions and Energy Savings in a Hot Dry Climate

Author: Farrar, S.; Hancock, E.; Anderson, R.

Source: Panel 1: Residential Buildings: Technologies, Design, and Performance Analysis. 1998 ACEEE Summer Study on Energy Efficiency in Buildings Proceedings.

Pages/Volumes: pp. 1.79-1.91

Publication Year: 1999

Publisher, Place: Washington, DC: American Council for an Energy-Efficient Economy

Subject Category: Hot-Dry Climate

Document Type: Technical Reports

Abstract: To evaluate opportunities for reducing cooling energy use in a hot dry climate, two new production houses located near Phoenix, Arizona, were studied: 1) a control home built with standard construction and 2) a prototype home with an integrated package of energy-saving features. The prototype's energy saving features included spectrally selective windows, interior air handler location, low-loss ducts, and high efficiency air-conditioning equipment. Both houses were monitored while unoccupied for a period of several weeks during very hot weather to evaluate cooling energy use. A comparison of short periods of detailed data showed a cooling energy use reduction of approximately 40% during peak summer conditions. Effects of the various energy-saving measures and their interactions were separated by a series of test that focused on specific components of the overall cooling load. It is important to understand the interactions of shell measures with mechanical system measures to properly size equipment and minimize overall system costs. An experimental technique was also developed to directly measure the contribution of window solar gains to overall cooling loads.

Report Number: 24524

Hot-Humid Climates

[PDF 1.1 MB](#)

Title: Show Home Targets Energy Efficiency in Hot-Humid Climate. Building Technologies Program (BTP) Building America (Brochure).

Pages/Volumes: 6 pp.

Publication Year: 2004

Subject Category: Hot-Humid Climate

Document Type: Project Summaries

NTIS/GPO Number: 15011694

Abstract: This brochure describes The New American Home, an annual project that is focused on the future of homebuilding. Industry experts team to design, build, and monitor a demonstration home that has been equipped with the latest marketable technologies and projects.

Report Numbers: BR-550-36266; DOE/GO-102004-2023

[PDF 1.6 MB](#)

Title: Residential Dehumidification Systems Research for Hot-Humid Climates: September 1, 2001 - December 30, 2003.

Author: Rudd, A. F.; Lstiburek, J. W.; Eng, P.; Ueno, K.

Pages/Volumes: 42 pp.

Publication Year: 2005

Notes: Work performed by Building Science Corporation, Westford, Massachusetts.

Subject Category: Hot-Humid Climate; Cooling Systems; Moisture Control; Ventilation Systems

Document Type: Technical Reports

Abstract: Twenty homes were tested and monitored in the hot-humid climate of Houston, Texas, U.S.A., to evaluate the humidity control performance and operating cost of six different integrated dehumidification and ventilation systems that could be applied by production homebuilders. Temperature and relative humidity were monitored at four living-space locations and in the conditioned attic where the space-conditioning equipment and air-distribution ducts were located. Equipment operational time was monitored for heating, cooling, dehumidification, and ventilation. Results showed that energy efficiency measures, combined with controlled mechanical ventilation, change the sensible and latent cooling load fractions such that dehumidification separate from the cooling system is required to maintain indoor relative humidity below 60% throughout the year. The system providing the best overall value, including humidity control, first cost, and operating cost, involved a standard dehumidifier located in a hall closet with a louvered door and central-fan-integrated supply ventilation with fan cycling.

Report Numbers: SR-550-36643

[PDF 8.1 MB](#)

Title: Building America Best Practices Series: Volume 1; Builders and Buyers Handbook for Improving New Home Efficiency, Comfort, and Durability in the Hot and Humid Climate.

Author: Baechler, M. C.; Love, P. M.

Pages/Volumes: 137 pp.

Publication Year: 2004

Subject Category: Hot-Humid Climate

Document Type: Design Guides

Abstract: This Building America Best Practices guide book is a resource to help builders large and small build high-quality, energy-efficient homes that achieve 30% energy savings in space conditioning and water heating in the hot and humid climate. The savings are in comparison with the 1993 Model Energy Code. The guide contains chapters for every member of the builder's team. There is also a chapter for homeowners on how to use the book to provide help in selecting a new home or builder.

Report Numbers: TP-550-36960

Title: An Innovative Approach to Reducing Duct Heat Gains for a Production Builder in a Hot and Humid Climate—How We Got There.

Author: Griffiths, D.; Aldrich, R.; Zoeller, W.; Zuluaga, M.

Pages/Volumes: 10 pp

Notes: Presented at 2002 ACEEE Summer Study on Energy Efficiency in Buildings, 18-23 August 2002, Asilomar Conference Center, Pacific Grove, CA.

Subject Category: Air Distribution Systems

Document Type: Technical Reports

Abstract: The Consortium for Advanced Residential Buildings (CARB), one of five Building America industry teams, has been working with Mercedes Homes in Melbourne, Florida, to improve their product with energy-, material-, and labor-saving strategies. Typical construction for Mercedes, and other builders in the area, is a single-story on a slab foundation with all HVAC supply ductwork in the attic feeding ceiling supply registers. A key element of the systems engineering approach for most Building America projects has been to improve space conditioning system efficiency by reducing or eliminating duct losses or gains. To date CARB has worked with Mercedes through the design and construction of three different homes involving different innovations. A different strategy for addressing the attic duct heat gain has been applied in each of the three homes. The first strategy was to bury the ducts under blow attic insulation, and monitoring was performed to assess the potential for condensation problems on the surfaces of the ducts. The second strategy brought the ducts down out of the attic and hid them in dropped ceiling chases. The third strategy involves an innovative redesign of the roof trusses to provide a chase space for the duct system that can be isolated from the attic conditions. This paper further describes each of the three strategies and their field implementation. To order this publication go to the ACEEE Web site www.aceee.org

Report Numbers: 33990

[PDF 258 KB](#)

Title: Show Me the Money: Selling Builders on Systems Engineering. Industrialized Housing Partnership (BAIHP)

Author: Fonorow, K.

Pages/Volumes: 7 pp.

Publication Year: 2003

Notes: Posted on this Web site with permission from Building America Industrialized Housing Partnership.

Subject Category: Hot-Humid Climate

Document Type: Project Summaries

Abstract: Atlantic Design & Construction is a small, privately held residential construction company located in Gainesville, Florida. Founded in 1985, the firm now directly employs 15 full-time employees and sells about 50-60 homes a year. Like any business, Atlantic Design & Construction is interested in both short-term and long-term profitability. Showing this multiple award-winning company how they could increase their profits when they actively promoted Energy Star and Building America was the key to a successful partnership. Though initially producing homes better than the Florida Energy Code minimum, the company considered, included, then actively promoted concepts and measures they found effective in both cost and value.

Report Number: 34799

[PDF 957 KB](#)

Title: Measured and Simulated Cooling Performance Comparison; Insulated Concrete Form Versus Frame Construction

Author: Chasar, D.; Moyer, N.; Rudd, A.; Parker, D.; Subrato, C.

Pages/Volumes: 10 pp.

Publication Year: 2003

Notes: Posted on this site with permission from Building America Industrialized Housing Partnership.

Subject Category: Hot-Humid Climate

Document Type: Project Summaries

Abstract: Four occupied homes near Dallas, Texas were monitored to compare cooling energy use. Two homes were built with typical wood frame construction, the other two with insulated concrete form (ICF) construction. Remote data loggers collected hourly readings of indoor and outdoor temperature, relative humidity, furnace runtime fraction, total building electrical energy and HVAC energy use. Data was recorded from January through August 2000. Analysis of the

measured data shows that insulated concrete form (ICF) construction can reduce seasonal cooling energy use 17-19% over frame construction in two-story homes in the North Texas climate. This result includes adjustments to compensate for differences in miscellaneous energy use, (e.g., lights & appliances), and duct leakage. While each home pair had the same floor plan, elevations and orientation there were some differences that were not accounted for in the measured results. These included occupant impacts, exterior wall color (absorptance) and the absence of an attic radiant barrier in one ICF home. In addition to analyzing the measured data, two sets of DOE2 simulations were performed. An initial comparison of ICF and frame homes modeled in their as-built condition was followed by a comparison of homes modeled with identical features except for wall construction. Both analyses showed a 13% annual cooling energy savings for ICF over frame construction. This result is comparable to a similar simulation study (Gajda 2001) of a two-story home in the Dallas climate, which saved 15% annually on both heating and cooling.

Report Number: 34800

[PDF 697 KB](#)

Title: The Building America Industrialized Housing Partnership (BAIHP)

Author: Florida Solar Energy Center (FSEC)

Pages/Volumes: 9 pp.

Publication Year: 2003

Notes: Posted on this site with permission from Building America Industrialized Housing Partnership.

Subject Category: Hot-Humid Climate

Document Type: Program Summaries

Abstract: This paper summarizes the multifaceted work being performed by BAIHP and provides specific data on 310 homes constructed in Gainesville, Florida, area with technical assistance from Florida Home Energy and Resources Organization. The paper also summarizes typical causes and cures for moisture problems in manufactured homes.

Report Number: 34801

[PDF 537 KB](#)

Title: Performance and Impact from Duct Repair and Ventilation Modifications of Two Newly Constructed Manufactured Houses Located in a Hot and Humid Climate

Author: Withers, C.; Chasar, D.; Moyer, N.; Chandra, S.

Pages/Volumes: 12 pp.

Publication Year: 2003

Notes: Posted on this site with permission from Building America Industrialized Housing Partnership.

Subject Category: Hot-Humid Climate

Document Type: Project Summaries

Abstract: Two nearly identical houses situated next to each other in Bossier City, Louisiana, were studied in an effort to better understand moisture and cooling energy related problems in manufactured houses with low thermostat set-points during the cooling season. By design, the major difference between houses was the type of air condition units. House A had a standard split air conditioner and House B had a two-speed split air conditioner. In an effort to make the buildings more similar, the building airtightness was adjusted until it was the same in each house, and duct leaks were sealed so that the ducts were tight and there was equal tightness in both houses. A ventilation system was also added at the same time of duct repair. Duct repair and the ventilation modifications resulted in significant impacts on the cooling energy, temperature, relative humidity, and building pressures. Cooling energy decreased 37% in House A and 18% in House B, while the floor space dewpoint increased significantly. It is estimated that 35% savings was due solely to duct repair in House A and 17% in House B. The primary cause of House A savings being twice House B is attributed to House A operating at nearly twice the capacity most of the time and had more duct leakage repaired. This resulted in higher system pressures and therefore greater duct leakage than in House B. Before building modifications, House A used 15.4 kWh per day (32%) more than House B and 3.4 kWh per day (11%) more after modifications. A method of characterizing interstitial spaces using dewpoint measurement is presented and shows that the belly space became 2.6 times more like outdoor conditions after repairs in House A and 2.0 times more in House B.

Report Number: 34802

[PDF 680 KB](#)

Title: Design and Construction of Interior Duct Systems

Author: McIlvaine, J.; Beal, D.; Fairey, P.

Pages/Volumes: 14 pp.

Publication Year: 2002

Notes: Posted on this site with permission from Building America Industrialized Housing Partnership.

Subject Category: Hot-Humid Climate

Document Type: Technical Reports

Abstract: To combat the energy, durability, and indoor air quality penalties of duct leakage, energy experts have recommended putting the duct system and air handler inside the conditioned space. Two paths of accomplishing this have emerged: unvented attics/crawl spaces and interior chases. This study focuses on the design, construction, and performance of the interior chase approach as implemented by five different builders in Texas, North Carolina, and Florida. Researchers found that, in many cases, breeches of the air barrier were evident from simple visual inspection. Critical points of design and construction were identified and will be presented through photos, design and construction guidelines, and drawings suitable for construction documents.

Report Number: 34803

[PDF 56 MB](#)

Title: Energy Efficiency and Moisture Retention Data Report: 2001 Field Evaluation of 16 North Carolina Manufactured Homes

Author: Markle, D.; Dugger, C.; Moyer, N.

Pages/Volumes: 25 pp.

Publication Year: 2001

Notes: Posted on this site with permission from Building America Industrialized Housing Partnership.

Subject Category: Hot-Humid Climate

Document Type: Project Summaries

Abstract: Blue Sky Foundation, in coordination with the Florida Solar Energy Center (FSEC), conducted an evaluation of energy efficiency and the moisture damage potential in 16 North Carolina homes in the summer of 2001. Blue Sky Foundation proposed that the field evaluation of energy and moisture focus on the integrity of the building envelope, HVAC duct systems, and the moisture impact of un-vented space heaters. All of the homes in the study were manufactured models located in Carteret and Craven counties, both located on the coast of North Carolina. Only three of the 15 tested homes are recorded as having moisture and/or mildew problems. This small sample by itself means little and will need to be evaluated in a larger data set, which is planned.

Report Number: 34805

[PDF 1.7 MB](#)

Title: Builder's Guide: Hot-Humid Climates.

Author: Lstiburek, J.

Pages/Volumes: 18 pp.

Publication Year: 2000

Notes: Posted on this Web site with permission from Building Science Consortium.

Subject Category: Hot-Humid Climate

Document Type: Design Guides

Abstract: This builder's guide for hot-humid climates includes hundreds of pages of illustrations and resources on such subjects as house layout and design, foundations, framing, HVAC, insulation, drywall, plumbing, electrical systems, painting, sheathings and windows all with respect to moisture control, energy efficiency and proper ventilation.

Report Number: 31218

[PDF 181 KB](#)

Title: Insulated Concrete Homes Increase Durability and Energy Efficiency: Mercedes Homes—Melbourne, Florida. Building America Project Summary Fact Sheet.

Pages/Volumes: 2 pp.

Publication Year: 2001

Subject Category: Hot-Humid Climate

Document Type: Project Summaries

Abstract: New houses designed by Mercedes Homes in Melbourne, Florida, with technical support from the U.S. Department of Energy's Building America Program, save their homeowners

money by using energy efficient features such as a high performance heat pump and solar control glazing to reduce cooling costs.

Report Numbers: FS-550-30386

[PDF 1.4 MB](#)

Title: Prototype House Provides Test Case for Energy-Efficient Systems: Mitchell Homes, Pensacola, Florida. Building America Project Summary Fact Sheet.

Pages/Volumes: 2 pp.

Publication Year: 2000

Subject Category: Hot-Humid Climate

Document Type: Project Summaries

Abstract: The Carbelle prototype house is a new design produced under the U.S. Department of Energy's Building America program. Working with other members of the Consortium for Advanced Residential Buildings, Mitchell Homes developed the Carbelle as an energy-efficient upgrade to one of their standard models. By treating all design aspects of the house as a system and involving all stakeholders in the process, Mitchell experts to decrease on-site energy use for space heating and cooling by as much as 40% compared to their typical construction.

Report Numbers: FS-550-27209

[PDF 235 KB](#)

Title: Precast CARB Home Begun.

Source: Rural Builder. March 2000

Pages/Volumes: p. 6

Editor: Erik Stottrup, ed.

Publication Year: 2000

Notes: Posted on this Web site with permission from Rural Builder Magazine.

Subject Category: Hot-Humid Climate

Document Type: Magazine/Newspaper Articles

Abstract: One of the latest energy efficiency experiments by the Consortium for Advanced Residential Buildings (CARB) is a home being built by Mercedes Homes in Melbourne, Florida.

Report Numbers: JA-610-31185

Hot Water Systems

[PDF 197 KB](#)

Title: Field Investigation of 18 Solar-Assisted Domestic Hot Water Systems with Integral Collector Storage.

Author: Rittelmann, W.

Pages/Volumes: 6 pp.

Publication Year: 2004

Notes: Work performed by IBACOS, Pittsburgh, PA. Proceedings of the ASES 2004 Conference.

Subject Category: Hot-Dry Climate; Hot Water Systems

Document Type: Technical Reports

Abstract: The purpose of this field investigation was to verify the energy performance of solar-assisted residential domestic hot water (DHW) systems in the community of Civano in Tucson, AZ. DHW systems in 18 homes were monitored for 15 to 24 months. Each system incorporates an Integral Collector Storage (ICS) panel and a tank-type water heater. System variations include nine systems with electric water heaters and nine systems with gas-fired water heaters, four of which also provide space heating. Energy impacts pipe lengths and hot water recirculation systems are also examined. Results show that a properly installed and operated system with an electric water heater has an annual solar fraction between 0.48 and 0.66. Systems with extensive piping can consume approximately 190% as much energy per gallon as the best systems, and recirculation systems combined with ICS can result in energy consumption that is almost 550% higher than a non-solar DHW system.

Report Numbers: 37793

[PDF 3.1 MB](#)

Title: Are You Getting into Hot Water.

Author: Wendt, R.; Baskin, E.

Pages/Volumes: 4 pp.

Publication Year: 2003

Notes: Posted on this site with permission from Home Energy Magazine.

Subject Category: Hot Water Systems

Document Type: Magazine/Newspaper Articles

Abstract: As a result of homes becoming larger and the installation of inefficient hot water distribution systems, some Americans are waiting minutes for hot water, or wasting a lot of money in their utility bills, or both. This article evaluates the performance of typical hot water distribution systems, and of various alternative systems and options that are designed to improve the performance of the typical system.

Report Numbers: 35351

[PDF 1.0 MB](#)

Title: Performance Comparison of Residential Hot Water Systems; Period of Performance: January 30, 2001 through July 29, 2002.

Author: Wiehagen, J.; Sikora, J. L.

Pages/Volumes: 61 pp.

Publication Year: 2003

Notes: Work performed by NAHB Research Center, Upper Marlboro, Maryland.

Subject Category: Advanced Systems; Hot Water Systems

Document Type: Technical Reports

Abstract: A laboratory test experiment was conducted to measure the energy performance of two different types of water heaters—electric storage tank and demand (tankless)—in two types of plumbing distribution systems—copper piping in a tree configuration and cross-linked polyethylene (PEX) piping in a parallel configuration. Two water-usage patterns were used in the week-long experiments and in the annual simulations: one representing a high-usage home and the other representing a low-usage home. Results of weekly performance testing and annual simulations of electric water-heating systems are presented.

Report Number: SR-550-32922

[PDF 836 KB](#)

Title: Water Heating: Office of Building Technology, State and Community Programs (BTS) Technology Fact Sheet.

Pages/Volumes: 4 pp.

Publication Year: 2001

Subject Category: Hot Water Systems

Document Type: Bulletins

Abstract: Fact sheet for homeowners and contractors on how to supply hot water in the home while saving energy.

Report Numbers: BR-810-26465; DOE/GO-102001-0785

Humidity Control Systems

[PDF 281 KB](#)

Title: Relative Humidity.

Author: Lstiburek, J.

Source: Proceedings of the Healthy Indoor Environments Conference, April 23, 2002, Austin, Texas.

Pages/Volumes: 10 pp.

Publication Year: 2002

Publisher, Place: Madison, NJ: IAQ Media Group

Notes: Posted on this site with permission from IAQ Media Group.

Subject Category: Humidity Control Systems

Document Type: Technical Reports

Abstract: Determining the correct range of humidity depends on where the home is located, how the home is constructed, the time of year, and the sensitivity of the occupants.

Report Number: 33077

Lighting Systems

[PDF 692 KB](#)

Title: Efficient Lighting Strategies: Wise Design Choices Can Meet Lighting Needs and Save Energy. Building Technologies Program, Office of Energy Efficiency and Renewable Energy (EERE) (Brochure).

Pages/Volumes: 6 pp.

Publication Year: 2002

Subject Category: Lighting Systems

Document Type: Bulletins

NTIS/GPO Number: 15002862

Abstract: Fact sheet for homeowners and contractors on how to employ efficient lighting strategies in the home for comfort and safety.

Report Numbers: BR-840-26467; DOE/GO-102002-0787

[PDF 750 KB](#)

Title: Vision 2020: The Lighting Technology Roadmap, Executive Summary (Brochure).

Pages/Volumes: 6 pp.

Publication Year: 2000

Subject Category: Lighting Systems

Document Type: Strategic Plans

Abstract: Technology roadmap describing technology vision, barriers, and RD&D goals and strategies compiled by lighting industry stakeholders and government agencies.

Report Numbers: BR-810-28236; DOE/GO-102000-1015

Manufactured Housing

[PDF 1.9 MB](#)

Title: Quality Homes in Demand at Summerset at Frick Park.

Author: IBACOS

Pages/Volumes: 12 pp

Publication Year: 2004

Subject Category: Quality Control Tools; Lighting Systems; Moisture Control

Document Type: Bulletins

Abstract: Every homebuilder dreams of customers banging down their door, begging "Build me a home!" The builders at the Summerset at Frick Park community in Pittsburgh, Pennsylvania, are getting closer to that dream. But it hasn't come easy. In an effort to meet the community's performance goals, each of the builders has had their share of struggles in learning new ways of designing and building their homes. The payoff makes it worth it in the end, though, as strong and constant demand for Summerset homes has boosted their bottom line.

Report Numbers: 35819

[PDF 431 KB](#)

Title: Large-Production Home Builder Experience with Zero Energy Homes: Preprint.

Author: Farhar, B.C.; Coburn, T.C.; Murphy, M.

Pages/Volumes: 15 pp.

Publication Year: 2004

Notes: Prepared for the ACEEE Summer Study on Energy Efficiency in Buildings, 22-27 August 2004, Pacific Grove, California

Subject Category: Onsite Power Systems; Performance Analysis and Tests

Document Type: Technical Reports

NTIS/GPO Number: 15008799

Abstract: Since 2001, a large production builder in San Diego, California, SheaHomes, has developed and sold 306 homes in two communities with zero energy homes features. These are highly energy-efficient homes with solar water heating and solar electric systems. This paper describes the builder's experience in deciding on, building, and marketing zero energy homes. Also described are the distribution of energy features among the homes sold, whether the solar electric systems were purchased as optional or standard equipment, and system sizes.

Report Numbers: CP-550-35913

[PDF 124 KB](#)

Title: Aspen Homes' System First to Include Guarantee.

Author: Andrews, S.

Source: HomeBuilder Magazine.

Pages/Volumes: 4 pp.

Publication Year: 2003

Subject Category: Advanced Systems; Cold Climate

Document Type: Magazine/Newspaper Articles

Abstract: Aspen Homes of Colorado, Inc. (Loveland, CO) builds around 135 homes a year, priced between \$150,000 and the mid-\$200s. Beginning in December of 2002, all of their buyers will be moving into high-performance homes. The company has shifted their focus toward building systems that lead to the construction of very energy-efficient, comfortable, healthy,

durable and environmentally responsible homes.

Report Numbers: 34631

[PDF 108 KB](#)

Title: Energy-Efficient Manufactured Homes.

Author: Harris, B.

Source: Home Energy Magazine. May/June 2002

Pages/Volumes: 2 pp

Publication Year: 2002

Subject Category: Manufactured Housing

Document Type: Magazine/Newspaper Articles

Abstract: Manufactured homes can be designed to be at least 60% more energy efficient than standard models currently rolling out of factories. That's a bold claim, but some research in North Carolina has the data to back it up. Since December 2000, North Carolina A&T State University (NCATU) has partnered with U.S. DOE's Building America Industrialized Housing Partnership (BAIHP) to monitor the energy efficiency of two homes manufactured by Palm Harbor Homes, Incorporated.

Report Numbers: 36010

[PDF 1.1 MB](#)

Title: Energy Efficient Industrialized Housing Research Summary of FY 1998 Activities (BAIHP)

Author: McIlvaine, J.; Beal, D.; Chandra, S.; Rudd, A.; Buehrlein, B.; McCloud, M.

Pages/Volumes: 28 pp.

Publication Year: 2003

Notes: Posted on this site with permission from Building America Industrialized Housing Partnership.

Subject Category: Hot-Humid Climate; Manufactured Housing

Document Type: Project Summaries

Abstract: The objectives of this work are to increase the market share of energy-efficient housing by conducting field testing and monitoring, research, development, design assistance, and training activities in partnership with housing manufacturers, production builders, non-profits and related members of the housing industry.

Report Number: 34806

[PDF 676 KB](#)

Title: Measured and Predicted Energy Savings from an Industrialized House

Author: Rudd, A.; Katakam, S.; Chandra, S.

Source: Panel 5: Commissioning, Operation, and Maintenance. ACEEE 1994 Summer Study on Energy Efficiency in Buildings Proceedings.

Pages/Volumes: pp. 5.225-5.232

Publication Year: 1994

Publisher, Place: Washington, D.C.: American Council for an Energy Efficient Economy (ACEEE)

Notes: Reprinted with permission. (c)Copyright 1994. Proceedings from the 1994 Summer Study on Energy-Efficiency in Buildings. American Council for an Energy-Efficient Economy: Washington, D.C., Vol. 5, pp. 225-232.

Subject Category: Manufactured Housing

Document Type: Technical Reports; Project Summaries

Abstract: Side-by-side energy testing and monitoring was conducted on two houses in Louisville, Kentucky. Both houses were identical except that one house was constructed with conventional U.S. 2x4 studs and a truss roof, while the other house was constructed with stress-skin insulated-core panels for the walls and second-floor ceiling.

Report Number: 31070

[PDF 303 KB](#)

Title: The Building America Industrialized Housing Partnership (BAIHP). Enhancing energy efficiency, durability and indoor air quality of industrialized housing.

Author: Chandra, S.; Moyer, N.; Beal, D.; Chasar, D.; McIlvaine, J.; Withers, C.

Source: XXIX IAHS World Congress on Housing.

Publication Year: 2001

Publisher, Place: Ljubljana, Slovenia

Notes: Posted on this Web site with permission from Building America Industrialized Housing Partnership (BAIHP).

Subject Category: Manufactured Housing; Hot-Humid Climate

Document Type: Technical Reports

Abstract: The Building America Industrialized Housing Partnership project activities are described. Details are provided on causes and solutions to moisture problems in manufactured housing. Data is presented on field diagnostic tests conducted on six homes with moisture problems.

Report Number: 31066

[PDF 1.0 MB](#)

Title: Moisture Problems in Manufactured Housing: Probable Causes and Cures

Author: Moyer, N.; Beal, D.; Chasar, D.; McIlvaine, J.; Withers, C.; Chandra, S.

Source: IAQ 2001- Moisture, Microbes and Health Effects: Indoor Air Quality and Moisture in Buildings. Proceedings of the Indoor Air Quality Conference, 5-7 November 2001, San Francisco, CA.

Pages/Volumes: 20 pp.

Publication Year: 2001

Publisher, Place: Atlanta, GA: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE)

Notes: The following article was published in ASHRAE Indoor Air Quality 2001 Conference, Nov 5-7, 2001. Copyright 1997 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. This posting is by permission of ASHRAE and is presented for education purposes only. ASHRAE does not endorse or recommend commercial products or services. This article may not be copied and/or distributed electronically or in paper form without permission of ASHRAE.

Contact ASHRAE at www.ashrae.org.

Subject Category: Manufactured Housing; Humidity Control Systems; Moisture Control

Document Type: Technical Reports

Abstract: A significant number of new manufactured houses built to HUD code and located in the hot, humid Southeast are experiencing moisture problems. Soft wallboards, buckled floors, damaged wood molding and extensive mold growth are the most common symptoms. These problems do not respond to the standard service and repair strategies for water intrusion.

Report Number: 32144

[PDF 417 KB](#)

Title: Ventilation in U.S. Manufactured Homes: Requirements, Issues and Recommendations

Author: Lubliner, M.; Gordon, A.

Source: 21st Annual AIVC Conference, 26 - 29 September 2000, The Hague, Netherlands.

Pages/Volumes: 18 pp.

Publication Year: 2000

Notes: Posted on this Web site with permission from the author Michael Lubliner.

Subject Category: Manufactured Housing; Ventilation Systems

Document Type: Technical Reports

Abstract: U.S. manufactured homes are required to be built to Department of Housing and Urban Development's (HUD) Manufactured Home Construction and Safety Standards (MHCSS). The National Fire Protection Association recently updated ventilation standards for manufactured homes (NFPA501-1999). HUD will review and consider adopting the NFPA501-129999 ventilation standards for their revisions to the MHCSS.

Report Number: 31067

[PDF 106 KB](#)

Title: Measured Air-Tightness and Thermal Insulation Quality of 11 Industrialized Houses

Author: Rudd, A.; Chandra, S.; Tooley, J.

Source: 1993 EEBA / NESEA Conference on Building Solutions, 3 - 6 March 1993, Boston, MA.

Pages/Volumes: pp. 8-12

Publication Year: 1993

Publisher, Place: Minneapolis, MN: Energy Efficient Building Association

Notes: Posted on this Web site with permission from the Energy Efficient Building Association.

Subject Category: Manufactured Housing

Document Type: Technical Reports; Project Summaries

Abstract: Building air-tightness and thermal insulation quality has been evaluated for five major industrialized housing manufacturers in the U.S. A small sample size of 11 houses has been tested to date. The sample includes factory stud-frame panelized, foam core panel, and modular construction.

Report Number: 31069

[PDF 1.6 MB](#)

Title: Up to 50% Energy Savings Proven Possible: University Studies Energy Efficiencies in Manufactured Housing
Author: Sedan, P.
Source: Automated Builder Magazine. Vol. 38(6) June 2001
Pages/Volumes: pp. 20-21
Publication Year: 2001
Notes: Posted with permission from Automated Builder Magazine.
Subject Category: Manufactured Housing
Document Type: Magazine/Newspaper Articles; Project Summaries
Abstract: Using two, identical, double-section HUD-code units, professors and students from North Carolina Agricultural and Technical University (NCA&T) in Greensboro, North Carolina, have begun studying the impact that specific energy-saving features may have on today's manufactured housing.
Report Number: JA-610-31000

[PDF 3.3 MB](#)

Title: Champion Enterprises Builds First HUD-Code Home Made of SIPs: DOE Tests Insulation for Building America Program
Source: Automated Builder Magazine. Vol. 37(10) October 2000
Pages/Volumes: pp. 16-18
Publication Year: 2000
Notes: Posted with permission from Automated Builder Magazine.
Subject Category: Manufactured Housing
Document Type: Magazine/Newspaper Articles; Project Summaries
Abstract: Champion Enterprises, Inc., a world leader in home building, and the U.S. Department of Energy partnered in producing the first manufactured HUD-Code home constructed entirely of structural insulated panels (SIPs). The unit came off the production line in early July and will undergo extensive testing for energy efficiency with expectations of saving over 50% of energy (heating and cooling) costs compared to a minimum standard HUD-Code house.
Report Number: JA-610-30975

[PDF 3.4 MB](#)

Title: Industrialized Housing Partnership (BAIHP): BAIHP Project Goals.
Source: Industrialized Housing Partnership (BAIHP)
Pages/Volumes: 2 pp.
Editor: Subrato, C.
Notes: Posted on this Web site with permission from Florida Solar Energy Center.
Subject Category: Manufactured Housing
Document Type: Project Summaries
Abstract: This fact sheet lists Building America Industrialized Housing Partnership (BAIHP) Project Goals, BAIHP Leaders, BAIHP Scope, and BAIHP Activities
Report Number: 30945

Mixed-Dry Climate

[PDF 928 KB](#)

Title: Process and Energy Efficiency Review for Premier Building Systems, Kent, Washington
Author: Brown, G.; Kellet, R.; Haas, P.; McIlvaine, J.; Mullens, M.; Read, P.; Rudd, A.
Pages/Volumes: 25 pp.
Publication Year: 2003
Notes: Posted on this site with permission from Building America Industrialized Housing Partnership.
Subject Category: Envelope and Window Systems; Mixed-Dry Climate
Document Type: Project Summaries
Abstract: The Energy Efficient Industrialized Housing (EEIH) project seeks to help industry increase the energy efficiency of its products and its productivity. Industry can take advantage of the EEIH project by participating in a short but intensive two-and-a-half-day PEER (Process and Energy Efficiency Review) visit.
Report Number: 34810

[PDF 1.8 MB](#)

Title: El Rancho Grande, Artistic Homes, Albuquerque, New Mexico
Source: Building Science Consortium.

Pages/Volumes: 2 pp.

Publication Year: 2002

Notes: This publication is a Building America project. Online at www.buildingscience.com.

Subject Category: Mixed-Dry Climate

Document Type: Project Summaries

Abstract: El Rancho Grande community of Albuquerque, New Mexico, is a project of Artistic Homes. It was built as part of the Building America program for energy-efficient homes.

Report Number: 31673

[**PDF 341 KB**](#)

Title: Neighboring builder plows new ground

Author: Andrews, S.

Source: HomeBuilder Magazine. Vol. 40(6) June 2001

Pages/Volumes: pp. 14-15, 20-21

Publication Year: 2001

Notes: Posted on this Web site with permission from Home Builders Association of Metropolitan Denver.

Subject Category: Mixed-Dry Climate; Hot-Dry Climate

Document Type: Magazine/Newspaper Articles

Abstract: Artistic Homes is New Mexico's largest builder. Last year they sold 689 homes, priced between \$80,000 and \$115,000, to first-time buyers

Report Number: 32109

[**PDF 293 KB**](#)

Title: Unvented Attic Increases Energy Efficiency and Reduces Duct Losses: Pulte Homes - Sun Lakes at Banning, California. Building America Project Summary Fact Sheet.

Pages/Volumes: 2 pp.

Publication Year: 2001

Subject Category: Hot-Dry Climate; Mixed-Dry Climate

Document Type: Project Summaries

Abstract: New houses in the Sun Lakes at Banning subdivision are designed by Pulte Homes with technical support from the Building Science Consortium as part of the U.S. Department of Energy's Building America Program. These homes save their homeowners money by applying the principles of "whole-building" design, which considers the house as a complete system instead of separate components.

Report Number: FS-550-30909

[**PDF 892 KB**](#)

Title: Building America Developments, October 2000, Information Bulletin Number 2 (Rev. July 2001)

Pages/Volumes: 3 pp.

Publication Year: 2000

Notes: Available electronically only.

Subject Category: Mixed-Dry Climate

Document Type: Bulletins

Abstract: This special issue of Building America Developments highlights the new Artistic Homes' models at the Albuquerque Parade of Homes. These new model homes are designed to reduce energy use by 30% to 50% over that of standard, typically constructed new production homes in Albuquerque, New Mexico. The Green Builder Program is also being offered in Metro Albuquerque.

Report Number: BR-550-28952

Mixed-Humid Climate

[**PDF 1.2 MB**](#)

Title: Hathaway "Solar Patriot" House: A Case Study in Efficiency and Renewable Energy.

Author: Norton, P.; Hancock, E.; Barker, G.; Reeves, P.

Pages/Volumes: 59 pp.

Publication Year: 2005

Subject Category: Mixed-Humid Climate; Onsite Power Systems

Document Type: Technical Reports

NTIS/GPO Number: 15016267

Abstract: This report details the monitored and modeled performance of a solar home outside of

Washington, D.C. We modeled the home energy performance using DOE2.2, performed numerous short-terms tests on the home and monitored its occupied performance for 29 months. The home uses modular construction, solar water heating, a ground-coupled heat pump, efficient appliances and compact fluorescent lighting to reduce its energy consumption by 35% compared to the Building America research benchmark home. The addition of 6kW of photovoltaics increases the savings to 67% compared to the Building America research benchmark. A more efficient shell to reduce space conditioning loads would have brought the home closer to its zero energy goals. However, even with efficient lighting and appliances, the lights, appliance and plug loads are a significant energy consumer. About 4 kW of PV are required to meet the needs of these loads alone. To achieve the zero energy goal with no further efficiency increases, the Hathaway house would need about 2.6 kW of PV in addition to the 6.0 kW it now has.

Report Numbers: TP-550-37731

[PDF 3.1 MB](#)

Title: Energy Efficient Manufactured Homes.

Author: Harris, B.

Pages/Volumes: 2 pp.

Publication Year: 2002

Notes: Posted on this site with permission from Home Energy Magazine.

Subject Category: Mixed-Humid Climate

Document Type: Magazine/Newspaper Articles

Abstract: Manufactured homes can be designed to be at least 60% more energy efficient than standard models currently rolling out of factories. That's a bold claim, but some research in North Carolina has the data to back it up. Since December 2000, North Carolina A&T State University (NCATU) has partnered with U.S. DOE's Building America Industrialized Housing Partnership (BAIHP) to monitor the energy efficiency of two homes manufactured by Palm Harbor Homes, Incorporated. The two homes were assembled side by side on the university campus. One was built to meet HUD standards while the other includes many energy-saving upgrades. Data will be collected until July 2002. Before that time the researchers will make changes to the homes.

Report Numbers: 35207

[PDF 2.3 MB](#)

Title: The Green House Shows the Way.

Author: Duncan, P.; Hunt, S.

Pages/Volumes: 3 pp.

Publication Year: 2003

Notes: Posted on this site with permission from Home Energy Magazine.

Subject Category: Mixed-Humid Climate

Document Type: Magazine/Newspaper Articles

Abstract: The Green House project focuses on the renovation of one house, with an emphasis on sustainability. The building is approximately 60 years old, roughly 870 square feet, and typical of the homes in the region. It is now a demonstration home that can be used to educate residents of the community on sustainable renovation and retrofit strategies that are applicable to their own homes. Helping residents to understand how individual renovation activities impact other systems in the house is seen as vital, regardless of how many different measures are implemented at once.

Report Numbers: 35007

[PDF 516 KB](#)

Title: Measured Air-Tightness and Thermal Insulation Quality of 11 Industrialized Homes

Author: Rudd, A.; Chandra, S.; Tooley, J.

Pages/Volumes: 11 pp.

Publication Year: 2003

Notes: Posted on this site with permission from Building America Industrialized Housing Partnership.

Subject Category: Mixed-Humid Climate; Ventilation Systems

Document Type: Project Summaries

Abstract: Building air-tightness and thermal insulation quality has been evaluated for five major industrialized housing manufacturers in the U.S. A small sample size of 11 houses has been tested to date. The sample includes factory stud-frame panelized, foam core panel, and modular

construction. Reference air-tightness numbers such as air change rate at 50 Pascal pressure difference, effective leak area, equivalent leak area, and specific leak area are reported. For the houses with forced air distribution systems, a duct leakage and house pressure balance analysis was also conducted. Special attention was paid to the air distribution system and its impact on energy efficiency, health, safety and durability. Thermal insulation quality was evaluated using an infrared imaging system. Infrared images showing conduction through framing components, misplaced or missing insulation, convective air paths which short circuit insulation, air leakage in marriage walls and duct leakage are presented.

Report Number: 34809

PDF 1.56 MB

Title: Builder's Guide: Mixed-Humid Climates

Author: Lstiburek, J.

Pages/Volumes: 12 pp.

Publication Year: 2000

Notes: Posted on this Web site with permission from the Building Science Consortium.

Subject Category: Mixed-Humid Climate

Document Type: Design Guides

Abstract: This builder's guide is for homes in the mixed-humid climate and includes hundreds of pages of illustrations and resources on such subjects as house layout and design, foundations, framing, HVAC, insulation, drywall, plumbing, electrical systems, painting, sheathings and windows all with respect to moisture control, energy efficiency and proper ventilation.

Report Number: 31216

PDF 1.2 MB

Title: Fairburn, Atlanta, Georgia, for Health-E Enterprises

Source: Building Science Consortium.

Pages/Volumes: 1 pp.

Publication Year: 2002

Notes: This publication was done for Building America. Online at www.buildingscience.com.

Subject Category: Mixed-Humid Climate

Document Type: Project Summaries

Abstract: Fairburn is the first energy-efficient, healthy, affordable community in metro Atlanta. It is built by Health-E Enterprises of the Building Science Consortium.

Report Number: 31672

PDF 753 KB

Title: EcoVillage Cleveland at 58th St., Cleveland, Ohio

Source: Building Science Consortium.

Pages/Volumes: 2 pp.

Publication Year: 2002

Notes: This publication is a Building America project. Online at www.buildingscience.com.

Subject Category: Mixed-Humid Climate

Document Type: Project Summaries

Abstract: EcoVillage Cleveland works under the Building America premise that high performance homes must be sustainable both environmentally and economically.

Report Number: 31676

PDF 269 KB

Title: New American Home(R): Atlanta, Georgia—2002. Office of Building Technology, State and Community Programs (BTS), Building America Brochure

Pages/Volumes: 4 pp.

Publication Year: 2002

Subject Category: Mixed-Humid Climate

Document Type: Project Summaries

NTIS/GPO Number: 15000214

Abstract: The New American Home is an annual showcase project designed by committee and co-sponsored by the National Association of Home Builders' (NAHB) National Council of the Housing Industry (NCHI). This year's project is built by John Wieland Homes and Neighborhoods and supported by IBACOS.

Report Number: BR-550-31470

[PDF 280 KB](#)

Title: Building America Developments, February 2001, Information Bulletin Number 3 (Rev. July 2001)
Pages/Volumes: 4 pp.
Publication Year: 2001
Subject Category: Mixed-Humid Climate
Document Type: Bulletins
Abstract: This document is one in a series of information bulletins about the Building America program, member teams, and current projects. This bulletin highlights the construction completed in Atlanta, Georgia, and will focus on the projects related to the International Builders' Show.
Report Number: BR-550-29122

[PDF 326 KB](#)

Title: New American Home (R): Atlanta, Georgia 2001; Building America—The New American Home. Office of Building Technology, State and Community Programs (BTS) Brochure
Pages/Volumes: 4 pp.
Publication Year: 2001
Subject Category: Mixed-Humid Climate
Document Type: Project Summaries
Abstract: The New American Home (R) is an annual showcase project designed by committee and co-sponsored by the National Association of Home Builders' National Council of the Housing Industry, BUILDERS Magazine, and Ladies Home Journal. Hedgewood Properties teamed with Building America's IBACOS Consortium and Southface Energy Institute to build a house with a Home Energy Rating Systems (HERS) level of 90.
Report Number: FS-550-30722

[PDF 180 KB](#)

Title: Whole-Building Design Increases Energy Efficiency in a Mixed-Humid Climate: Ideal Homes, Norman, Oklahoma. Building America Project Summary Fact Sheet
Pages/Volumes: 2 pp.
Publication Year: 2001
Subject Category: Mixed-Humid Climate
Document Type: Project Summaries
Abstract: New houses designed by Ideal Homes, with technical support from the U.S. Department of Energy's Building America Program, save their homeowners money by applying the principles of "whole-building" design. The homes are in Norman, Oklahoma.
Report Number: FS-550-30504

Moisture Control

[PDF 861 KB](#)

Title: Moisture Issues in Homes with Brick Veneer.
Author: IBACOS
Pages/Volumes: 3 pp
Publication Year: 2002
Subject Category: Envelope and Window Systems; Moisture Control
Document Type: Design Guides
Abstract: Brick veneer is a porous material. Both air and water can penetrate it, allowing moisture to move toward the wood framed walls of a home. The air space behind the brick allows moisture to be forced upwards due to stack effect, which allows this warm moist air to condense on cold surfaces like roof sheathing in an attic. Moisture on wood sheathing members can also lead to rot and possibly mold growth, both issues of safety, health, and durability in a home. Through our work with builders, IBACOS has seen various problems caused by a lack of air and moisture management techniques in homes that are clad with brick veneer. The details in this fact sheet will help to ensure the durability, health, and safety of the home. Frequent inspections during construction to verify that proper techniques are being implemented are important to ensure quality.
Report Numbers: 36397

[PDF 545 KB](#)

Title: Insulations, Sheathings, and Vapor Diffusion Retarders.
Author: Building Science Corporation
Pages/Volumes: 18 pp

Publication Year: 2003

Notes: Posted on this site with permission from Building Science Corporation.

Subject Category: Moisture Control

Document Type: Technical Reports

Abstract: Two seemingly innocuous requirements for building envelope assemblies bedevil builders and designers almost endlessly: keep water vapor out; let the water vapor out if it gets in. It gets complicated because, sometimes, the best strategies to keep water vapor out also trap water vapor in. This can be a real problem if the assemblies start out wet because of rain or the use of wet materials (wet framing, concrete, masonry, or damp spray cellulose, fiberglass or rock wool cavity insulation). It gets even more complicated because of climate. In general water vapor moves from the warm side of building assemblies to the cold side of building assemblies. This means we need different strategies for different climates. We also have to take into account differences between summer and winter. Building assemblies, regardless of climate zone, need to control the migration of moisture as a result of both vapor diffusion and air transport. Techniques that are effective in controlling vapor diffusion can be very different from those that control air transported moisture.

Report Numbers: 35793

[**PDF 496 KB**](#)

Title: Let's Talk about Moisture and Mold IBACOS Quality Home Newsletter—May 2002.

Author: IBACOS

Pages/Volumes: 6 pp.

Publication Year: 2002

Notes: Posted on this site with permission from IBACOS.

Subject Category: Moisture Control; Ventilation Systems

Document Type: Bulletins

Abstract: This year we've had our share of moisture and mold. We now know more about stachybotrys, aspergillus, and the like, than any nonbiologist would care to know. Hundreds of media-published discussions cite anywhere from 22,000 to 100,000 varieties of mold and fungi. "Mold experts" have crawled out of the woodwork with a wide variety of mold identification kits, remediation strategies, and even "mold sniffing dogs" by the names of Oskar and Ninja.

Report Numbers: 34815

[**PDF 69 KB**](#)

Title: Mold Remediation in Occupied Homes

Author: Yost, N.; Lstiburek, J.; Brennan, T.

Pages/Volumes: 4 pp.

Publication Year: 2002

Notes: Posted on this site with permission from Building Science Consortium.

Subject Category: Moisture Control

Document Type: Technical Reports

Abstract: The recommendations presented are based on the current NYC Health Department guidelines. The purpose of this document is to assist builders with the decisions regarding what to do and how to do it when mold is found in specific locations. The New York City guidelines are based on the area (number of square feet) that have mold on them. Unfortunately the area of involvement is often difficult to determine before removing sheathing or gypsum board. These recommendations are based on typical locations where moisture and mold occur in houses. Each case, however, is somewhat different, so proceed with caution and realize that the problem might be greater than anticipated.

Report Number: 35010

[**PDF 82 KB**](#)

Title: Mold: Causes, Health Effects and Clean-Up

Author: Lstiburek, J.; Yost, N.; Brennan, T.

Pages/Volumes: 5 pp.

Publication Year: 2002

Notes: Posted on this site with permission from Building Science Consortium.

Subject Category: Moisture Control

Document Type: Technical Reports

Abstract: Mold requires water. No water, no mold. Mold is the result of a water problem. Fix the water problem. Clean up the mold. And you have fixed the mold problem. To avoid mold problems, avoid water problems. Design and build in a manner that reduces water problems.

Mold also requires food. The food it likes best is cellulose—the more processed the better. Mold really likes wet paper. It kind of likes wet wood, but not as much as it likes wet paper. It likes processed wood better than it likes real wood. So mold likes oriented strand board (OSB) better than plywood and plywood better than a stud or a joist. Mold also likes the feces of cockroaches and dust mites, as well as some pastes, paints and adhesives. Just because something gets wet, it doesn't mean it will get moldy. It needs to be wet for a while. Wet paper needs to be wet for a couple of days. Wet wood, for a couple of weeks. And it also needs to be warm. Warm, wet paper that is wet for a while is a problem. Because it usually takes time for mold to grow, promptly drying the building after a water event will prevent a mold problem from developing. Of course, make certain that the underlying problem that caused the water problem is also corrected.

Report Number: 35012

[PDF 41 KB](#)

Title: What You Need to Know About Mold

Author: Yost, N.; Lstiburek, J.; Brennan, T.

Pages/Volumes: 2 pp.

Notes: Posted on this site with permission from Building Science Consortium.

Subject Category: Moisture Control

Document Type: Technical Reports

Abstract: This document explains what mold is, how it grows, health effects of mold, how to prevent mold, preventing moisture, and other information regarding mold.

Report Number: 35013

[PDF 41 KB](#)

Title: Mold Testing

Author: Yost, N.; Lstiburek, J.; Brennan, T.

Pages/Volumes: 3 pp.

Notes: Posted on this site with permission from the Building Science Consortium.

Subject Category: Moisture Control

Document Type: Technical Reports

Abstract: Homeowners want to know if they have a mold problem. Investigators want to find out where the mold is. Insurance companies want to know if the mold has been cleaned up. Doctors want to know if there has been exposure to mold. So why not do mold testing? This sounds very scientific. If only it were that simple. The problems with testing are: Airborne fungal spore concentrations vary greatly over the course of hours, days, weeks and seasons. A sample taken at one instant in time, at one location, may not be representative of typical conditions. There are no numerical standards to which tests can be compared making interpretation difficult. Even extensive, well made tests cannot determine how much exposure people had in the past. Fungal air tests are expensive to make. Any money spent on mold testing will not be available for cleaning up the mold and fixing the water problem that led to the mold. It may be days, often weeks before the results of testing are known. Testing for mold should be done to answer specific questions that can't be answered by easier, more accurate or more direct approaches with fewer uncertainties. Neither the New York City (NYC) Department of Health nor the Environmental Protection Agency (EPA) recommend measuring airborne fungal levels. The likelihood that airborne samples will provide information that careful inspection does not is very small. Airborne sampling should be limited to instances where people are experiencing symptoms that seem to be mold related, but no mold is found by inspection.

Report Number: 35014

Onsite Power Systems

[PDF 5.7 MB](#)

Title: System Integration of Distributed Power for Complete Building Systems: Phase 1 Report.

Author: Kramer, R.

Pages/Volumes: 198 pp.

Publication Year: 2003

Notes: Work performed by NiSource Energy Technologies, Merrillville, Indiana.

Subject Category: Onsite Power Systems

Document Type: Technical Reports

NTIS/GPO Number: 15005923

Abstract: This report describes NiSource Energy Technologies Inc.'s base year of a planned 3-

year effort to advance distributed power development, deployment, and integration. Its long-term goal is to design ways to extend distributed generation into the physical design and controls of buildings. NET worked to meet this goal through advances in the implementation and control of CHP systems in end-user environments and a further understanding of electric interconnection and siting issues. Important results from the first year were a survey of the state of the art of interconnection issues associated with distributed generation, a survey of the local zoning requirements for the NiSource service territory, and the acquisition of data about the operation, reliability, interconnection, and performance of CHP systems and components of two test sites.

Report Numbers: SR-560-34966

[PDF 4.7 MB](#)

Title: System Integration of Distributed Power for Complete Building Systems: Phase 2 Report.

Author: Kramer, R.

Pages/Volumes: 258 pp.

Publication Year: 2003

Notes: Work performed by NiSource Energy Technologies, Merrillville, Indiana.

Subject Category: Onsite Power Systems

Document Type: Technical Reports

NTIS/GPO Number: 15006055

Abstract: This report describes NiSource Energy Technologies Inc.'s second year of a planned 3-year effort to advance distributed power development, deployment, and integration. Its long-term goal is to design ways to extend distributed generation into the physical design and controls of buildings. NET worked to meet this goal through advances in the implementation and control of combined heat and power systems in end-user environments and a further understanding of electric interconnection and siting issues. The specific objective of work under this subcontract is to identify the system integration and implementation issues of DG and develop and test potential solutions to these issues. In addition, recommendations are made to resolve identified issues that may hinder or slow the integration of integrated energy systems into the national energy picture.

Report Numbers: SR-560-35054

[No PDF](#)

Title: Predicting Long-Term Performance of Photovoltaic Arrays Using Short-Term Test Data and an Annual Simulation Tool

Author: Barker, G.; Norton, P.

Source: Proceedings of the Solar 2003 Conference Including Proceedings of 32nd ASES Annual Conference and Proceedings of 28th National Passive Solar Conference, 21-26 June 2003, Austin, Texas.

Pages/Volumes: pp. 407-414

Editor: Campbell-Howe, R. ed.

Publication Year: 2003

Publisher, Place: Boulder, CO: American Solar Energy Society, Inc., (ASES)

Notes: For preprint version, including full text online document, see NREL/CP-550-33601.

Subject Category: Onsite Power Systems

Document Type: Technical Reports

Report Number: CP-550-34752

[PDF 671 KB](#)

Title: Predicting Long-Term Performance of Photovoltaic Arrays Using Short-Term Test Data and an Annual Simulation Tool: Preprint

Author: Barker, G.; Norton, P.

Pages/Volumes: 11 pp.

Publication Year: 2003

Notes: Prepared for the Solar 2003 Conference: America's Secure Energy, 21-26 June 2003, Austin, Texas

Subject Category: Onsite Power Systems

Document Type: Technical Reports

NTIS/GPO Number: 15003725

Abstract: We present a method of analysis for predicting annual performance of an in-situ photovoltaic (PV) array using short-term test data and an annual simulation tool. The method involves fitting data from a family of I-V curves (depicting current versus voltage) taken from a short-term test (1 to 3 day) of a PV array to a set of polynomial functions. These functions are

used to predict the array's behaviour under a wide range of temperatures and irradiances. TRNSYS, driven by TMY2 weather data, is used to simulate the array's behaviour under typical weather conditions. We demonstrate this method by using results from a nominal 630-W array.
Report Number: CP-550-33601

[PDF 737 KB](#)

Title: Building America System Performance Test Practices: Part 1—Photovoltaic Systems
Author: Barker, G.; Norton, P.
Pages/Volumes: 40 pp.
Publication Year: 2003
Subject Category: Onsite Power Systems
Document Type: Technical Reports
NTIS/GPO Number: 15003878
Abstract: The report outlines the short-term field testing used by Building America staff and includes a report on the results of an example test of a PV system with battery storage on a home in Tucson, Arizona. This report is not intended as a general recommended test procedure for wide distribution. It is intended to document current practices in Building America to inform program stakeholders and stimulate further discussion. Building America staff intend to apply this procedure until relevant standards for testing PV modules are completed.
Report Number: TP-550-30301

[PDF 173 KB](#)

Title: Procedures for Solar Electric System Design and Installation: Section 2
Author: ConSol
Pages/Volumes: 9 pp.
Publication Year: 2001
Notes: Posted on this site with permission from ConSol.
Subject Category: Onsite Power Systems
Document Type: Bulletins
Abstract: There are several areas of benefit of incorporating a PV system in residential developments: price stability, bill reduction, environmental benefits, power reliability and security, value and comfort, builder differentiation and technical advantage.
Report Number: 35063

[PDF 61 KB](#)

Title: Procedures for Solar Electric System Design Installation: Section 3
Author: ConSol
Pages/Volumes: 3 pp.
Publication Year: 2001
Notes: Posted on this site with permission from ConSol.
Subject Category: Onsite Power Systems
Document Type: Design Guides
Abstract: The goal for a solar electric, or photovoltaic (PV) system is to provide high-quality, reliable renewable electrical power to a home. This section contains detailed information on system design, fabrication, installation, and performance testing.
Report Number: 35064

[PDF 104 KB](#)

Title: Procedures for Solar Electric System Design and Installation: Section 4
Author: ConSol
Pages/Volumes: 5 pp.
Publication Year: 2001
Notes: Posted on this site with permission from ConSol.
Subject Category: Onsite Power Systems
Document Type: Bulletins
Abstract: The goal for a solar electric, or photovoltaic (PV) system is to provide high-quality, reliable renewable electrical power to a home. This section contains a detailed checklist for the solar electric (pv) system design and installation.
Report Number: 35069

[PDF 37 KB](#)

Title: Procedures for Solar Electric System Design and Installation: Section 1
Author: ConSol
Pages/Volumes: 2 pp.
Publication Year: 2001

Notes: Posted on this site with permission from Building Science Consortium.

Subject Category: Onsite Power Systems

Document Type: Design Guides

Abstract: The goal for a solar electric, or photovoltaic (PV) system is to provide high-quality, reliable renewable electrical power to a home. This section contains detailed information on system design, fabrication, installation, and performance testing.

Report Numbers: 35070

[PDF 37 KB](#)

Title: Building Science Consortium's PV Primer

Source: Building Science Consortium.

Pages/Volumes: 4 pp.

Notes: Posted on this site with permission from Building Science Consortium.

Subject Category: Onsite Power Systems

Document Type: Design Guides

Abstract: A 2 kW PV system that can provide a large portion of the electrical needs for a high performance home currently runs about \$15,000 to \$20,000, or about \$8 to \$10/Wp. A 5 kW system that handles the entire electrical needs of a conventional home currently runs about \$30,000 to \$40,000, or about \$6 to \$8/Wp. Many states have PV subsidy programs, and the federal government is working on legislation that would provide tax subsidies for residential PV systems. For homes that are a quarter of a mile or more from a grid connection, PV is a clear winner. For homes with frequent power interruptions or lacking sufficient electrical "quality," PV can mean a truly functional and reliable home. And for the rest of us, PV systems are inching their way onto our radar screens as the cost, environmental impact, and security issues surrounding conventional power generation increase and the cost of PV systems continues to decline.

Report Numbers: 35206

[PDF 987 KB](#)

Title: Guidelines for the Economic Evaluation of Building-Integrated Photovoltaic Power Systems. Photovoltaic Power Systems in the Built Environment.

Author: Eiffert, P.; International Energy Agency (IEA) PVPS Task 7

Pages/Volumes: 52 pp.

Publication Year: 2003

Subject Category: Onsite Power Systems

Document Type: Technical Reports

NTIS/GPO Number: 15003041

Abstract: This report identifies the economic parameters of building-integrated PV (BIPV) systems. The guidelines are structured in three major parts: the investment analysis (methods and ownership issues), benefits, and costs. Measurement and verification are also discussed briefly. The outline and evaluation of investment analysis methods showed their effectiveness for BIPV systems. All investment methods can be used to evaluate BIPV economics (in relation to other techniques). However, for designing and sizing BIPV systems, either net present value or life cycle cost is recommended. The advantages of BIPV systems include multiple (building) functions, electricity benefits, grid-support benefits, control of load growth by utilities (institutionalized by utility and national incentives and programs), demand savings, power quality and reliability, promotional and educational benefits, environmental benefits, shading and thermal benefits, and security. Each topic is addressed, and international examples are given for most. The costs of BIPV systems depend on the system technology, utility interconnection costs, labor and installation costs, associated costs for building permits, maintenance costs, costs for replacement and repair, and the salvage costs (or value). Each topic is addressed, and international examples are given for most.

Report Number: TP-550-31977

Performance Analysis and Tests

No PDF

Title: Hathaway "Solar Patriot" Home: Performance Testing and Simulation Results.
Author: Norton, P.; Hancock, C. E.; Barker, G.; Reeves, P.
Source: Proceedings of the World Renewable Energy Congress VIII (WREC 2004), 29 August--3 September 2004, Denver, Colorado (CD-ROM).
Pages/Volumes: 5 pp.
Editor: A.A.M. Sayigh, ed.
Publication Year: 2004
Publisher, Place: [Amsterdam]: Elsevier, Ltd.; Monterey, CA: Produced by InControl Productions, Inc.
Subject Category: Mixed-Humid Climate; Onsite Power Systems
Document Type: Technical Reports
Report Numbers: CP-550-36013

[PDF 3.5 MB](#)

Title: Evaluation of the Field Performance of Residential Fuel Cells: Final Report.
Author: Torrero, E.; McClelland, R.
Pages/Volumes: 139 pp.
Publication Year: 2004
Notes: Work performed by Cooperative Research Network, National Rural Electric Cooperative Association, Arlington, Virginia and Energy Signature Associates Inc., Pittsburgh, Pennsylvania.
Subject Category: Onsite Power Systems
Document Type: Technical Reports
NTIS/GPO Number: 15007778
Abstract: Distributed generation has attracted significant interest from rural electric cooperatives and their customers. Cooperatives have a particular nexus because of inherently low customer density, growth patterns at the end of long lines, and an influx of customers and high-tech industries seeking to diversify out of urban environments. Fuel cells are considered a particularly interesting DG candidate for these cooperatives because of their power quality, efficiency, and environmental benefits. The National Rural Electric Cooperative Association Cooperative Research Network residential fuel cell program demonstrated RFC power plants and assessed related technical and application issues. This final subcontract report is an assessment of the program's results. This 3-year program leveraged Department of Energy (DOE) and National Renewable Energy Laboratory (NREL) funding.
Report Numbers: SR-560-36229

[PDF 1.9 MB](#)

Title: Analysis of System Strategies Targeting Near-Term Building America Energy-Performance Goals for New Single-Family Homes: FY 2004 Fourth-Quarter Building America Milestone Report.
Author: Anderson, R.; Christensen, C.; Barker, G; Horowitz, S.; Courtney, A.; Givler, T.; Tupper, K.
Pages/Volumes: 55 pp.
Publication Year: 2004
Subject Category: System Engineering Research; Hot-Humid Climate; Hot-Dry Climate; Cold Climate; Mixed-Humid Climate
Document Type: Technical Reports
Abstract: The Building America residential systems research project uses an analysis-based system research approach to (1) Identify research priorities, (2) Identify technology gaps and opportunities, (3) Establish a consistent basis to track research progress, (4) Increase the cost effectiveness of research investments by identifying system solutions that are most likely to succeed as the initial targets for residential system research projects. This report describes the technical approach used by Building America to determine the most cost effective pathways to achieve whole-house energy savings goals. The report provides an overview of design/technology strategies leading to net zero energy buildings as the basis for analysis of future residential system performance. The analysis approach is demonstrated by providing an initial comparison of the least-cost options required to achieve 40% energy savings in five climate zones. The preliminary results from this study will be validated against field studies and updated on an annual basis to reflect best available residential system cost/performance data from ongoing Building America research activities.
Report Numbers: TP-550-36920

[PDF 1.3 MB](#)

Title: California RPS Integration Study: Phase I Summary and Results; Preprint.

Author: Milligan, M.; Kirby, B.; Jackson, K.; Shiu, H.; Makarov, Y.; Hawkins, D.

Pages/Volumes: 32 pp.

Publication Year: 2004

Notes: Prepared for the 2004 Global WINDPOWER Conference, 29-31 March 2004, Chicago, Illinois.

Subject Category: Onsite Power Systems

Document Type: Technical Reports

NTIS/GPO Number: 15007352

Abstract: California's recently enacted Renewables Portfolio Standard (RPS, Senate Bill 1078) requires the state's investor-owned utilities (IOUs) to increase the renewable portion of their energy mix, with a goal of 20% renewable energy generation by 2017. Renewable generation projects will compete with each other to supply the IOUs, with the California Public Utilities Commission (CPUC) establishing a process to select the "least-cost, best-fit" projects. The California Energy Commission (CEC), in support of the CPUC, organized a team to study integration costs in the context of RPS implementation. The analysis team, collectively referred to as the Methods Group, consists of researchers from the National Renewable Energy Laboratory and Oak Ridge National Laboratory and staff members from the California Independent System Operator, Dynamic Design Engineering, and the California Wind Energy Collaborative. This RPS Integration Study is motivated by the RPS's "least-cost, best-fit" bid selection criterion, which requires that indirect costs be considered in addition to the energy bid price when selecting eligible renewable projects. This paper summarizes the key results from the Phase I report. Specific issues examined in the report include capacity credit, regulation impacts and costs, and preliminary load-following impacts via the supplemental energy market in California. We also discuss the status of the RPS Integration Study and some implications for wind integration in other U.S. electric power markets.

Report Numbers: CP-500-35947

[PDF 381 KB](#)

Title: Improving Sustainability of Buildings Through a Performance-Based Design Approach: Preprint.

Author: Deru, M.; Torcellini, P.

Pages/Volumes: 8 pp.

Publication Year: 2004

Notes: Prepared for the World Renewable Energy Congress VIII, 29 August - 3 September 2004, Denver, Colorado

Subject Category: Cost-Performance Tradeoffs

Document Type: Technical Reports

NTIS/GPO Number: 15009461

Abstract: The design of most buildings is typically driven by budget, time, safety, and energy codes, producing buildings that just meet these minimum criteria. To achieve better or even exceptional energy performance in buildings, the design team needs to work with the building owner and others involved in the building process toward a focused energy performance goal. This paper describes the performance-based design process for buildings and benefits of this approach.

Report Numbers: CP-550-36276

[PDF 8.7 MB](#)

Title: Introduction to Building Systems Performance: Houses That Work II; Period of Performance: January 2003 - December 2003.

Pages/Volumes: 169 pp.

Publication Year: 2004

Notes: Work performed by Building Science Consortium, Westford, Massachusetts.

Subject Category: Performance Analysis and Tests; Cost-Performance Tradeoffs

Document Type: Technical Reports; Program Summaries; Project Summaries

NTIS/GPO Number: 15007447

Abstract: Buildings should be suited to their environments. Design and construction must be responsive to varying seismic risks, wind loads, and snow loads, as well as soil conditions, frost depth, orientation, and solar radiation. In addition, building envelopes and mechanical systems should be designed for a specific hygro-thermal regions, rain exposure, and interior climate. The Building Science Consortium (BSC) design recommendations are based on the hygro-thermal regions with reference to the annual rainfall. Local climate must be addressed if it differs

significantly from the climate described for a particular design.

Report Numbers: SR-550-34585

[**PDF 705 KB**](#)

Title: Northwest Portable Classroom Energy Study.

Pages/Volumes: 2 pp

Publication Year: 2003

Subject Category: Manufactured Housing

Document Type: Project Summaries

Abstract: Record numbers of students, demands for smaller class size, shrinking budgets, and growing infrastructure costs are spurring demand for portable classrooms in America's schools. 65% of schools in the West report using portable classrooms and 36% nationwide do so. Over 180,000 students attend school in about 6000 portables in the Northwest and districts installations are increasing at a rate of 5% per year. Nationally, student enrollment is expected to grow throughout the century.

Report Numbers: 36007

[**PDF 1.6 MB**](#)

Title: Preliminary Screening—Technical and Economic Assessment of Synthesis Gas to Fuels and Chemicals with Emphasis on the Potential for Biomass-Derived Syngas.

Author: Spath, P. L.; Dayton, D. C.

Pages/Volumes: 160 pp.

Publication Year: 2003

Subject Category: Onsite Power Systems

Document Type: Technical Reports

NTIS/GPO Number: 15006100

Abstract: In principle, syngas (primarily consisting of CO and H₂) can be produced from any hydrocarbon feedstock, including: natural gas, naphtha, residual oil, petroleum coke, coal, and biomass. The lowest cost routes for syngas production, however, are based on natural gas, the cheapest option being remote or stranded reserves. Economic considerations dictate that the current production of liquid fuels from syngas translates into the use of natural gas as the hydrocarbon source. Nevertheless, the syngas production operation in a gas-to-liquids plant amounts to greater than half of the capital cost of the plant. The choice of technology for syngas production also depends on the scale of the synthesis operation. Syngas production from solid fuels can require an even greater capital investment with the addition of feedstock handling and more complex syngas purification operations. The greatest impact on improving the economics of gas-to liquids plants is through 1) decreasing capital costs associated with syngas production and 2) improving the thermal efficiency with better heat integration and utilization. Improved thermal efficiency can be obtained by combining the gas-to-liquids plant with a power generation plant to take advantage of the availability of low-pressure steam. The extensive research and development efforts devoted to syngas conversion to fuels and chemicals are documented in a vast amount of literature that tracks the scientific and technological advancements in syngas chemistry. The purpose of this report is to review the many syngas to products processes and summarize the salient points regarding the technology status and description, chemistry, catalysts, reactors, gas cleanliness requirements, process and environmental performances, and economics. Table 1 lists the products examined in this study and gives some facts about the technology as well as advantages and disadvantages. Table 2 summarizes the catalysts, process conditions, conversions, and selectivities for the various syngas to products processes. Table 3 presents catalyst poisons for the various products.

Report Numbers: TP-510-34929

[PDF 2.5 MB](#)

Title: M&V Guidelines: Measurement and Verification for Federal Energy Projects, Version 2.2.
Author: Schiller, S. R.; Jump, D. A.; Franconi, E. M.; Stetz, M.; Geanacopoulos, A.
Pages/Volumes: 340 pp.
Publication Year: 2000
Subject Category: Performance Analysis and Tests
Document Type: Technical Reports
Abstract: This document provides guidelines and methods for measuring and verifying the savings associated with federal agency performance contracts. It contains procedures and guidelines for quantifying the savings resulting from energy efficiency equipment, water conservation, improved operation and maintenance, renewable energy, and cogeneration projects implemented under federal agency-financed energy savings performance contracts.
Report Numbers: BK-710-26265; DOE/GO-102000-0960

[No PDF](#)

Title: Design and Performance of the Van Geet Off-Grid Home.
Author: Barley, C. D.; Torcellini, P.; Van Geet, O.
Source: Journal of Solar Energy Engineering. Transactions of the ASME. Vol. 126 May 2004
Pages/Volumes: pp. 738-743
Publication Year: 2004
Notes: For preprint version, including online full-text document, see CP-550-32764.
Report Numbers: JA-550-36447

[PDF 214 KB](#)

Title: Setting up Performance and Prescriptive Criteria for Domestic Water Use and Construction Waste Generation.
Author: Anderson, R.; Yost, P.
Source: Building Science Corporation Web site. 2002
Pages/Volumes: 2 pp.
Publication Year: 2002
Publisher, Place: Building Science Corporation, Westford, MA.
Notes: Posted on this Web site with permission from Building Science Consortium.
Subject Category: Performance Analysis and Tests
Document Type: Technical Reports
Abstract: This fact sheet provides instructions on how to set up Performance and Prescriptive Criteria for domestic water use and construction waste generation.
Report Numbers: 31667

[PDF 1.8 MB](#)

Title: Short-Term Energy Monitoring: A Quick Way to Predict Long-Term Energy Performance. Energized (Fact sheet)
Pages/Volumes: 2 pp.
Publication Year: 1995
Subject Category: Performance Analysis and Tests
Document Type: Project Summaries
NTIS/GPO Number: DE95000254
Abstract: Long-term building energy efficiency can now be determined from building data collected during a short period. This fact sheet examines the STEM test, a rapid, cost-effective way to verify the energy performance of residential and small commercial buildings and isolate the effects of individual components that influence energy use.
Report Number: TP-470-5776-U

[PDF 446 KB](#)

Title: Growing market for high-performance homes
Author: Andrews, S.
Source: HomeBuilder Magazine. Vol. 41(7) July 2002
Pages/Volumes: pp. 8, 10, 18, 21
Publication Year: 2002
Notes: Posted on this Web site with permission from Homebuilder magazine.
Subject Category: Performance Analysis and Tests
Document Type: Magazine/Newspaper Articles
Abstract: A high-performance home, according to Mark LaLiberte, is a healthy, comfortable, affordable, energy efficient, environmentally responsible, and durable home. According to Ren Andersen, the key Building America performance objective is a 30-50 percent reduction in

energy consumption - compared to the same home built to the 1995 CABO Model Energy Code.
Report Number: 33071

[PDF 969 KB](#)

Title: International Performance Measurement & Verification Protocol: Concepts and Practices for Improved Indoor Environmental Quality, Volume II (Revised)
Pages/Volumes: 58 pp.
Publication Year: 2002
Subject Category: Performance Analysis and Tests
Document Type: Technical Reports
NTIS/GPO Number: 15000244
Abstract: This protocol serves as a framework to determine energy and water savings resulting from the implementation of an energy efficiency program. It is also intended to help monitor the performance of renewable energy systems and to enhance indoor environmental quality in buildings.
Report Number: TP-710-31601; DOE/GO-102002-1517

[PDF 2.6 MB](#)

Title: International Performance Measurement and Verification Protocol: Concepts and Options for Determining Energy and Water Savings, Volume I (Revised)
Pages/Volumes: 93 pp.
Publication Year: 2002
Subject Category: Performance Analysis and Tests
Document Type: Technical Reports
NTIS/GPO Number: 15000242
Abstract: This protocol serves as a framework to determine energy and water savings resulting from the implementation of an energy efficiency program. It is also intended to help monitor the performance of renewable energy systems and to enhance indoor environmental quality in buildings.
Report Numbers: TP-710-31505; DOE/GO-102002-1554

[PDF 623 KB](#)

Title: International Performance Measurement & Verification Protocol: Concepts and Options for Determining Energy and Water Savings, Volume I
Pages/Volumes: 101 pp.
Publication Year: 2001
Subject Category: Performance Analysis and Tests
Document Type: Technical Reports
Abstract: This international protocol describes a methodology for measuring energy and water savings.
Report Numbers: TP-810-29564; DOE/GO-102001-1187

[PDF 1.6 MB](#)

Title: Building America House Performance Analysis Procedures
Author: Hendron, B.; Farrar-Nagy, S.; Anderson, R.; Judkoff, R.; Reeves, P.; Hancock, E.
Pages/Volumes: 127 pp.
Publication Year: 2001
Subject Category: Performance Analysis and Tests
Document Type: Technical Reports
Abstract: As the Building America Program has grown to include a large and diverse cross section of the home building industry, accurate and consistent analysis techniques have become more important to help all program partners as they perform design tradeoffs and calculate energy savings for prototype houses built as part of the program. This document illustrates some of the analysis concepts proven effective and reliable for analyzing the transient energy usage of advanced energy systems as well as entire houses. The analysis procedure described here provides a starting point for calculating energy savings of a prototype house relative to two base cases: builder standard practice and regional standard practice. Also provides building simulation analysis to calculate annual energy savings based on side-by-side short-term field-testing of a prototype house.
Report Number: TP-550-27754

[PDF 308 KB](#)

Title: Multi-Criteria Decision-Making Process for Buildings: Preprint
Author: Balcomb, J. D.; Curtner, A.

Pages/Volumes: 10 pp.

Publication Year: 2000

Notes: Prepared for the American Institute of Aeronautics and Astronautics (AIAA) Conference, 24-28 July 2000, Las Vegas, Nevada

Subject Category: Performance Analysis and Tests

Document Type: Technical Reports

Abstract: This paper focuses on a process designed to facilitate two key decisions early in the building design process that are critical to a building's sustainability. As vital decisions are made during the building's design, the process and accompanying tools assist the design team in prioritizing their goals, setting performance targets, and evaluating design options to ensure that the most important issues affecting building sustainability are considered.

Report Number: CP-550-28533

[PDF 659 KB](#)

Title: National Status Report: Home Energy Rating Systems and Energy-Efficient Mortgages

Author: Plympton, P. C.

Pages/Volumes: 47 pp.

Publication Year: 2000

Subject Category: Performance Analysis and Tests

Document Type: Technical Reports

Abstract: The Energy Policy Act of 1992 included several provisions promoting the use of HERS and EEMs, which strengthened efforts to develop a national infrastructure for HERS and to promote the use of EEMs. This report documents HERS and EEMs activities since 1992 by the U.S. Department of Energy, the U.S. Environmental Protection Agency, the U.S. Department of Housing and Urban Development, mortgage lenders, and other organizations. Though the process of establishing HERS has faced some barriers, this report shows that, as of November 1999, home energy ratings were available in 47 states and the District of Columbia, which represents a significant increase from 1993 when home energy ratings were available in 17 states. Both national and state organizations have developed HERS and related residential energy-efficiency programs. The availability and use of EEMs has also increased significantly. The number of EEMs supported by the Federal Housing Administration has increased more than eight times in the last three years. More than \$2.5 billion in federally supported EEMs have been issued to date. Several national lenders offer EEMs, and six states have state-specific EEM or loan programs. EEMs have been used to finance energy-efficient homes in every state.

Report Number: TP-550-27635

[PDF 4.8 KB](#)

Title: New American Home to Win HERS Rating

Source: Energy Design Update. Vol. 20(12) December 2000

Pages/Volumes: pp. 1-2

Editor: Cutter Information Corporation

Publication Year: 2000

Publisher, Place: Surrey, New Hampshire

Notes: Posted on this Web site with permission from Cutter Information Corporation.

Subject Category: Performance Analysis and Tests

Document Type: Magazine/Newspaper Articles

Abstract: New American Home unveiled at the International Builders' Show in Atlanta, Georgia, in February 2001. Built by Hedgewood Properties, this large, plush home was equipped with many amenities and scored 90 or better on its Home Energy Rating (HERS)

Report Number: 30946

[PDF 953 KB](#)

Title: Side-By-Side Thermal Tests of Modular Offices: A Validation Study of the STEM Method

Author: Judkoff, R.; Balcomb, J. D.; Hancock, C. E.; Barker, G.; Subbarao, K.

Pages/Volumes: 39 pp.

Publication Year: 2000

Subject Category: Performance Analysis and Tests

Document Type: Technical Reports

Abstract: Two modular office units were tested at the National Renewable Energy Laboratory (NREL) to establish each unit's thermal performance. The two units were nearly identical in appearance, but one was built with structural insulating panels (SIP), and the other was built using standard frame construction. The primary objective of these tests was to compare the

thermal performance of buildings using SIP and standard frame construction. Both units were tested under carefully controlled steady-state conditions in the NREL large-scale environmental enclosure. They were then moved outdoors where Short-Term Energy Monitoring (STEM) tests were performed, and long-term heating and cooling energy use was measured. A secondary objective was to evaluate the accuracy of the NREL STEM method by comparing the results of outdoor STEM tests to steady-state indoor test results. STEM is a method developed by NREL to determine key thermal parameters of a building in-situ, based on a 3-day test sequence. The indoor test facility also provided the opportunity to investigate the phenomenon of infiltration heat recovery in a real building, under carefully controlled conditions, to evaluate the stability of the "concentration decay" method of tracer gas-based infiltration monitoring, and to compare the blower-door method with the tracer-gas technique in determining infiltration. This project was a cooperative effort with the Structural Insulated Panel Association, the Modular Building Institute, All-American Modular (AAM, the manufacturer of the units), and GE Capitol (the owner of the units). Richard Harmon, the president of AAM, requested NREL's assistance in exploring the feasibility of converting his manufacturing process to SIP construction. His engineering staff needed to assess which comfort and energy benefits might be associated with this new technology. AAM manufactured the two units, and NREL tested the modules for 8 months.

Report Number: TP-550-23940

[PDF 420 KB](#)

Title: Software Tools for Energy Efficient Buildings: BTS Buildings for the 21st Century Fact Sheet

Pages/Volumes: 2 pp.

Publication Year: 1999

Subject Category: Performance Analysis and Tests

Document Type: Technical Reports

Abstract: A summary of the software available to building industry professionals on the Internet Web site http://www.eere.energy.gov/buildings/tools_directory/.

Report Numbers: FS-26256; DOE/GO-10099-744

No PDF

Title: Using ENERGY-10 for Trade-Off Evaluations of Energy-Efficient Strategies in IEA Task 23

Author: Balcomb, J. D.

Source: Green Building Challenge '98: Proceedings of An International Conference on the Performance Assessment of Buildings, 26-28 October 1998, Vancouver, Canada.

Pages/Volumes: Vol. 1; pp. 355-362

Publication Year: 1999

Publisher, Place: Ottawa, Canada: Natural Resources Canada

Subject Category: Performance Analysis and Tests

Document Type: Technical Reports

Abstract: The International Energy Agency's Solar Heating and Cooling Program Task 23 entitled, "Optimization of Solar Energy Use in Large Buildings", focuses on the study of a design process that best enables a realization of low-energy buildings. The 5-year task is in its second year. Through a series of four subtasks, participants from 12 countries first identify the process employed in case-study buildings selected in each country and then focus on design-process recommendations. Key to the identification of appropriate strategies is the use of tools for trade-off analysis. The U.S. computer program ENERGY-10 is being used within the Task as an example of a design tool with most of the characteristics required. This paper discusses how ENERGY-10 is being used and identifies some intermediate results.

Report Number: 27169

No PDF

Title: Short-Term Energy Monitoring for Commercial Buildings

Author: Balcomb, J. D.; Burch, J. D.; Westby, R.; Subbarao, K.; Hancock, C. E.

Source: ACEEE 1994 Summer Study on Energy Efficiency in Buildings, 28 August - 3 September 1994: Proceedings, Panel 5 Commissioning, Operation, and Maintenance.

Pages/Volumes: pp. 5.1-5.10

Publication Year: 1994

Publisher, Place: Washington, DC: American Council for an Energy-Efficient Economy (ACEEE)

Subject Category: Performance Analysis and Tests

Document Type: Technical Reports

Abstract: The short-term energy monitoring (STEM) method is being used with commercial

buildings, starting with units in the 5,000 to 15,000-square-foot range. The method helps disaggregate and understand building heat flows to a degree that had not previously been demonstrated and with much greater accuracy.

Report Number: 20915

Severe Cold Climate

[PDF 1.1 MB](#)

Title: Oakbrooke Patio Homes, Pulte Homes, Minneapolis, Minnesota

Source: Building Science Consortium.

Pages/Volumes: 1 pp.

Publication Year: 2002

Notes: Published as part of Building America. Online at www.buildingscience.com.

Subject Category: Severe-Cold Climate

Document Type: Project Summaries

Abstract: Pulte-Minnesota has been working with Building Science Consortium and Building America since 1996 to build homes for severe cold climates.

Report Number: 31670

Solar Load Control Systems

[PDF 311 KB](#)

Title: Photovoltaic and Solar Thermal Modeling with the EnergyPlus Calculation Engine: Preprint.

Author: Griffith, B. T.; Ellis, P. G.

Pages/Volumes: 8 pp.

Publication Year: 2004

Notes: Prepared for the World Renewable Energy Congress VIII, 29 August - 3 September 2004, Denver, Colorado

Subject Category: Onsite Power Systems

Document Type: Technical Reports

NTIS/GPO Number: 15009460

Abstract: EnergyPlus is a whole-building energy analysis software program developed by DOE. It was recently expanded with the addition of new active solar components for simulation of photovoltaic and solar thermal hot-water heating systems. The active solar models were integrated into the program because low- or zero-energy buildings often use renewable energy resources to accomplish their energy-saving goals. This paper provides an overview of the new models for PV and solar collectors in EnergyPlus and describes some preliminary efforts to validate the implementations.

Report Numbers: CP-550-36275

[PDF 4.5 MB](#)

Title: Solar Energy Technologies Program: Multi-Year Technical Plan 2003-2007 and Beyond.

Pages/Volumes: 166 pp.

Publication Year: 2004

Subject Category: Onsite Power Systems

Document Type: Program Summaries

NTIS/GPO Number: 15007165

Abstract: This publication charts a 5-year planning cycle for the U.S. Department of Energy Solar Energy Technologies Program. The document includes anticipated technical plans for the next 5 years for photovoltaics, concentrating solar power, solar water and space heating, solar hybrid lighting, and other new concepts that can take advantage of the solar resource. Solar energy is described as a clean, abundant, renewable energy resource that can benefit the nation by diversifying our energy supply.

Report Numbers: MP-520-33875; DOE/GO-102004-1775

[PDF 332 KB](#)

Title: Commercial Status of the PV Industry in 2004—Identifying Important and Unimportant Factors: Preprint.

Author: von Roedern, B.

Pages/Volumes: 7 pp.

Publication Year: 2004

Notes: Prepared for the 14th Workshop on Crystalline Silicon Solar Cells and Modules, 8-11

August 2004, Winter Park, Colorado
Subject Category: Onsite Power Systems
Document Type: Technical Reports
NTIS/GPO Number: 15009891

Abstract: This paper reviews the current status of the commercial PV Industry. It assesses the current status of commercially available modules, most of which use silicon wafers or ribbons. My analysis will show that the choice of Si wafers or substrates, once deemed to be the most important aspect, ended up making only negligible differences for commercial products, as long as cells are prepared by diffusion and screen printing. I will also address the prospects and requirements for both next generation thin-film modules and super-high (>20%) efficient commercial crystalline Si cells. It is shown that traditional recombination loss analyses provide a poor tool for understanding limitations of cell and module performance, because those analytical schemes ignore dominating interactions between different loss mechanisms (e.g., of surface and bulk recombination).

Report Numbers: CP-520-36681

[PDF 389 KB](#)

Title: Solar Photovoltaic Hydrogen: The Technologies and Their Place in Our Roadmaps and Energy Economics.

Author: Kazmerski, L. L.; Broussard, K.

Pages/Volumes: 7 pp.

Publication Year: 2004

Notes: Prepared for the 19th European PV Solar Energy Conference and Exhibition, 7-11 June 2004, Paris, France

Subject Category: Onsite Power Systems

Document Type: Technical Reports

NTIS/GPO Number: 15009704

Abstract: Future solar photovoltaics-hydrogen systems are discussed in terms of the evolving hydrogen economy. The focus is on distributed hydrogen, relying on the same distributed-energy strengths of solar-photovoltaic electricity in the built environment. Solar-hydrogen residences/buildings, as well as solar parks, are presented. The economics, feasibility, and potential of these approaches are evaluated in terms of roadmap predictions on photovoltaic and hydrogen pathways-and whether solar-hydrogen fit in these strategies and timeframes. Issues with the "hydrogen future" are considered, and alternatives to this hydrogen future are examined.

Report Numbers: CP-520-36401

[PDF 438 KB](#)

Title: PV Manufacturing R&D Accomplishments and Status.

Author: Mooney, D.; Mitchell, R.; Witt, E.; King, R.; Ruby, D.

Pages/Volumes: 8 pp.

Publication Year: 2003

Subject Category: Onsite Power Systems

Document Type: Technical Reports

NTIS/GPO Number: 15005797

Abstract: The U.S. Department of Energy (DOE) PV Manufacturing Research and Development Project has worked for 11 years in partnership with the U.S. photovoltaic industry to reduce manufacturing costs while significantly scaling up production capacity. Over this period, the PV Manufacturing R&D Project has issued seven solicitations for partnerships that have resulted in over 50 cost-shared R&D subcontracts that addressed the cost and capacity goals of the Project, including 10 that are currently active. The previous and current contracts have typically focused on addressing Project goals in one of two areas: module manufacturing and balance-of-systems (BOS)/systems work. The majority of the DOE investment has been targeted toward module manufacturing. The partnerships have resulted in a significant and measurable increase in PV module/systems production capacity, a decrease in PV manufacturing costs, and a subsequent return on the joint public and private investments facilitated by the Project.

Report Numbers: TP-520-35278

[PDF 233 KB](#)

Title: Passive Solar Design. Office of Building Technology, State and Community Programs (BTS) Technology Fact Sheet.

Pages/Volumes: 4 pp.

Publication Year: 2000

Subject Category: Heating Systems; Cooling Systems

Document Type: Bulletins

Abstract: This fact sheet for homeowners and contractors shows how using passive solar design features in homes can increase energy efficiency and comfort. Topics include design techniques, cost, and passive solar design tools.

Report Numbers: BR-29236; DOE/GO-102000-0790

[PDF 414 KB](#)

Title: How to Size a Grid-Connected Solar Electric System: Better Buildings Series Solar Electric Fact Sheet

Pages/Volumes: 4 pp.

Publication Year: 2002

Subject Category: Solar Load Control Systems

Document Type: Technical Reports

NTIS/GPO Number: 15000946

Abstract: This fact sheet provides the consumer with a concise overview of how to size a grid-connected solar electric system. The initial process for collection of data is explained, followed by a description of how to use the data to determine the correct size of the system. A worksheet for determining the required number of panels for the consumer's home is included.

Report Numbers: FS-520-31688; DOE/GO-102002-1607

[PDF 212 KB](#)

Title: Passive Solar Design: The Foundation for Low-Energy Federal Buildings. Federal Energy Management Program (FEMP) Fact Sheet.

Pages/Volumes: 4 pp.

Publication Year: 2000

Subject Category: Solar Load Control Systems

Document Type: Bulletins

Abstract: This fact sheet updates a similar one published in 1996 for the U.S. Department of Energy's Federal Energy Management Program. It is part of a series of fact sheets on ways that the Federal government can incorporate new energy efficiency, solar energy, and other renewable energy technologies in buildings and other facilities to save on energy costs and reduce greenhouse gas emissions. This fact sheet describes strategies for implementing passive solar features—such as south-facing windows, daylighting, and thermal mass—into new building designs and retrofits. It also discusses how to design and build low-energy, sustainable buildings by using a "whole-building approach" to the design process. In this approach, designers not only use passive solar techniques, they also create a design that makes the most of the complex ways that a building's occupants, components, and materials connect and interact in order to achieve the greatest possible comfort and energy efficiency.

Report Numbers: 26015; DOE/GO-102000-728

System Engineering Research

[PDF 708 KB](#)

Title: Let's Talk about Comfort: IBACOS Quality Home Newsletter: July 2002.

Author: IBACOS

Pages/Volumes: 6 pp.

Publication Year: 2002

Notes: Posted on this site with permission from IBACOS.

Subject Category: System Engineering Research

Document Type: Bulletins

Abstract: If you asked homeowners to talk about loads, envelope performance or system sizing, they'd likely ignore you or change the subject. But, ask them whether their toes are cold when they watch TV in the den, or if their first floor is cold and clammy, and you're likely to get a far more animated response. Five major elements need to be addressed to provide an environment that will maintain thermal comfort: the thermal load on the building, the equipment sizing, the distribution system design, system installation, and system commissioning. The first three components require deliberate design and engineering. While larger heating and cooling equipment can overcome a multitude of sins committed in the design and construction of the house and the distributions system, simply throwing more horsepower at the problem adds expense and wastes energy, and it may also affect the ability of the cooling system to

dehumidify.

Report Numbers: 34819

[**PDF 768 KB**](#)

Title: Advanced Residential Lighting Design: IBACOS Quality Home Newsletter: January 2003.

Pages/Volumes: 6 pp.

Publication Year: 2003

Notes: Posted on this site with permission from IBACOS.

Subject Category: System Engineering Research

Document Type: Bulletins

Abstract: Ever sat down to watch TV and noticed glare on the screen from lamps or ceiling fixtures? Wanted to read a magazine in your favorite chair but had to squint because of poor lighting? Advanced approaches to residential lighting design address these issues, improving the aesthetics and comfort of the home, as well as safety and visibility in areas where homeowners perform common tasks. As an important component of high performance quality homes, advanced residential lighting design techniques can also reduce the home's energy use.

Report Numbers: 34792

[**PDF 1.4 MB**](#)

Title: BSC Final Report: Lessons Learned from Building America Participation; February 1995 - December 2002

Author: Building Science Corporation

Pages/Volumes: 35 pp.

Publication Year: 2003

Notes: Work performed by Building Science Corporation, Westford, Massachusetts.

Subject Category: System Engineering Research

Document Type: Project Summaries

NTIS/GPO Number: 15003593

Abstract: Over the past 5 years under the Building America program, the Building Science Consortium has worked with more than 25 builders in 121 developments, in 18 states, and in all six climate zones. This work has resulted in more than 7,000 ENERGY STAR(TM) homes built as of August 2002.

Report Number: SR-550-33100

[**PDF 1.3 MB**](#)

Title: IBACOS 2001 Final Technical Report: Building-Scale Project Results

Pages/Volumes: 70 pp.

Publication Year: 2003

Notes: Work performed by IBACOS Consortium, Pittsburgh, Pennsylvania.

Subject Category: System Engineering Research

Document Type: Project Summaries

NTIS/GPO Number: 15003587

Abstract: The focus of the IBACOS Building America Builder Program activities is working with builders to construct homes on a widespread basis that perform significantly better than their contemporary version and that advance residential building products and technologies. As part of the activities, performance goals are set for all homes in the areas of energy efficiency, indoor air quality, comfort, and durability. Integrated design, engineering, and construction-related work are conducted for each project. This work focuses on meeting the established goals through technical solutions.

Report Number: SR-550-31506

[**PDF 765 KB**](#)

Title: Hickory Consortium 2001 Final Report

Pages/Volumes: 40 pp.

Publication Year: 2003

Notes: Work performed by Hickory Consortium, Harvard, Massachusetts.

Subject Category: System Engineering Research

Document Type: Project Summaries

NTIS/GPO Number: 15003588

Abstract: As with all Building America Program consortia, systems thinking is the key to understanding the processes that Hickory Consortium hopes to improve. The Hickory Consortium applies this thinking to more than the whole-building concept. Their systems thinking embraces the meta process of how housing construction takes place in America. By understanding the

larger picture, they are able to identify areas where improvements can be made and how to implement them.

Report Number: SR-550-31726

[PDF 924 KB](#)

Title: Building America Program. 2002 State Energy Program / Rebuild America National Conference

Author: James, G.

Pages/Volumes: 27 pp.

Publication Year: 2002

Publisher, Place: New Orleans, Louisiana

Notes: 2002 State Energy Program / Rebuild America National Conference

Subject Category: System Engineering Research

Document Type: Presentations

Abstract: A summary of the research, development, technology implementation, and cost-share activities of Building America.

Report Number: 33225

[PDF 1.6 MB](#)

Title: Energy Star for Homes Progress Report (Viewgraphs)

Author: Lee, D.

Source: Building American Update Workshop.

Pages/Volumes: 25 pp.

Editor: Anderson, R., ed.

Publication Year: 2001

Subject Category: System Engineering Research

Document Type: Presentations

Abstract: How the ENERGY STAR for Homes program sells the concept of energy efficient homes to builders. Materials provided to builders of energy efficient homes and its relationship to Building America.

Report Number: PR-610-30960

[PDF 1.5 MB](#)

Title: Southface Energy Institute (Viewgraphs)

Author: Creech, D.

Source: Building America Update Workshop.

Pages/Volumes: 9 pp.

Editor: Anderson, R., ed.

Publication Year: 2001

Subject Category: System Engineering Research

Document Type: Presentations

Abstract: Southface Energy Institute of Building America summary of projects, partners, training and technical assistance.

Report Number: PR-610-30955

[PDF 748 KB](#)

Title: Whole-House Approach Benefits Builders, Buyers, and the Environment. Building America Program Overview: Office of Building Technology, State and Community Programs (BTS) Brochure.

Pages/Volumes: 8 pp.

Publication Year: 2001

Subject Category: System Engineering Research

Document Type: Program Summaries

NTIS/GPO Number: 15000960; 775818

Abstract: This document provides an overview of the U.S. Department of Energy's Building America program. Building America works with the residential building industry to develop and implement innovative building processes and technologies-innovations that save builders and homeowners millions of dollars in construction and energy costs. This industry-led, cost-shared partnership program aims to reduce energy use by 50% and reduce construction time and waste, improve indoor air quality and comfort, encourage a systems engineering approach for design and construction of new homes, and accelerate the development and adoption of high performance in production housing.

Report Number: BR-550-27745

[PDF 826 KB](#)

Title: Building America Program, ORNL Outreach (Viewgraphs only)

Author: Love, P.

Pages/Volumes: 12 pp.

Publication Year: 2001

Notes: Presentations from the Building America Update Workshop, 10-11 April 2001, Washington, DC.

Subject Category: System Engineering Research

Document Type: Presentations

Abstract: Provides introduction to Pacific Northwest National Laboratory and its Building America programs; discussion of design and construction of SIPs.

Report Number: PR-610-30949

[PDF 752 KB](#)

Title: Hickory Consortium (Viewgraphs only)

Author: Hampton, B.; Stuntz, S.

Pages/Volumes: 34 pp.

Publication Year: 2001

Notes: Presentations from the Building America Update Workshop, 10-11 April 2001, Washington, DC.

Subject Category: System Engineering Research

Document Type: Presentations

Abstract: Summary of the Hickory Consortium of Building America, their projects and success stories. Explanation of their strategy for Green building and sustainability.

Report Number: PR-610-30951

[PDF 89 KB](#)

Title: Partnership for Advancing Technology in Housing (PATH) (Viewgraphs only)

Author: Talbott, J.

Pages/Volumes: 10 pp.

Publication Year: 2001

Notes: Presentations from the Building America Update Workshop, 10-11 April 2001, Washington, DC.

Subject Category: System Engineering Research

Document Type: Presentations

Abstract: Goals of the Partnership for Advancing Technology in Housing (PATH) and industry-related PATH activities, including Building America.

Report Number: PR-610-30961

[PDF 2.6 MB](#)

Title: IBACOS: Home to Innovation (Viewgraphs)

Author: Oberg, B.

Source: Building America Update Workshop.

Pages/Volumes: 53 pp.

Editor: Anderson, R., ed.

Publication Year: 2001

Subject Category: System Engineering Research

Document Type: Presentations

Abstract: The IBACOS team of Building America summary of their Builders Programs, Buildings Partners, Manufacturer Partners, alliances and vision.

Report Number: PR-610-30952

[PDF 902 MB](#)

Title: Innovations in Manufactured Housing and Modular Classrooms (Viewgraphs only)

Author: Baechler, M.

Pages/Volumes: 15 pp.

Publication Year: 2001

Notes: Presentations from the Building America Update Workshop, 10-11 April 2001, Washington, DC.

Subject Category: System Engineering Research

Document Type: Presentations

Abstract: Provides introduction to Pacific Northwest National Laboratory and its Building America programs; discussion of design and construction of SIPs.

Report Number: PR-610-30948

[PDF 1 MB](#)

Title: Building America Update (Viewgraphs only)

Author: Anderson, R.

Pages/Volumes: 36 pp.

Publication Year: 2001

Notes: Presentations from the Building America Update Workshop, 10-11 April 2001, Washington, DC.

Subject Category: System Engineering Research

Document Type: Presentations

Abstract: Summary of Building America results, such as cost/benefits, technical and programmatic challenges, barriers, and strategic approaches.

Report Number: PR-610-30947

[PDF 2.6 MB](#)

Title: DOE Building America Program / DOE Buildings Technology Center Integration (Viewgraphs)

Author: Christian, J.

Source: Building America Update Workshop.

Pages/Volumes: 44 pp.

Editor: Anderson, R., ed.

Publication Year: 2001

Subject Category: System Engineering Research

Document Type: Presentations

Abstract: Building America program, Buildings Technology Center Integration promotes insulated concrete houses, its moisture research, systems integration, and whole wall hot box testing.

Report Number: PR-610-30962

[PDF 818 KB](#)

Title: Systems Engineering Approach to the Design of Energy and Resource Efficient Homes (Viewgraphs)

Author: Chism, L.

Source: Building American Update Workshop.

Pages/Volumes: 30 pp.

Editor: Anderson, R., ed.

Publication Year: 2001

Subject Category: System Engineering Research

Document Type: Presentations

Abstract: Home Builders Association of Central New Mexico summary of key program components in Building America, performance criteria, performance goals, cost tradeoffs.

Report Number: PR-610-30956

[PDF 944 KB](#)

Title: Building Science Consortium (Viewgraphs only)

Author: Pettit, B.

Pages/Volumes: 49 pp.

Publication Year: 2001

Notes: Presentations from the Building America Update Workshop, 10-11 April 2001, Washington, DC.

Subject Category: System Engineering Research

Document Type: Presentations

Abstract: Strategies to use Systems Engineering to develop cost trade-offs in Building America projects. Use of climate-specific strategies for improving the building envelope and downsizing of mechanical equipment.

Report Number: PR-610-30950

[PDF 1.6 MB](#)

Title: Consortium for Advanced Residential Buildings (CARB) (Viewgraphs only)

Author: Bruncati, C.; Zoeller, B.

Pages/Volumes: 30 pp.

Publication Year: 2001

Notes: Presentations from the Building America Update Workshop, 10-11 April 2001, Washington, DC.

Subject Category: System Engineering Research

Document Type: Presentations

Abstract: Mission statement for Consortium for Advanced Residential Buildings (CARB) of Building America. Summary of projects and associated builders.

Report Number: PR-610-30953

[PDF 6.7 MB](#)

Title: Florida Solar Energy Center: Industrialized Housing Partnership (Viewgraphs)

Author: Chandra, S.

Source: Building America Update Workshop.

Pages/Volumes: 69 pp.

Editor: Anderson, R., ed.

Publication Year: 2001

Subject Category: System Engineering Research

Document Type: Presentations

Abstract: Florida Solar Energy Center presents summary of Building America Industrialized Housing Partnership. Includes list of goals, description of teams and collaborators and program highlights.

Report Number: PR-610-30954

[PDF 2.0 MB](#)

Title: EEBA, Building America Integration Workshop (Viewgraphs)

Author: Guidera, K.

Source: Building America Update Workshop.

Pages/Volumes: 20 pp.

Editor: Anderson, R.

Publication Year: 2001

Subject Category: System Engineering Research

Document Type: Presentations

Abstract: Explanation of what is the Energy & Environmental Building Association (EEBA) and its relationship to Building America, what tools they use to reach the public, their curriculum modules, institute partners, and target audience.

Report Number: PR-610-30958

[PDF 382 KB](#)

Title: Future of Residential Green Buildings: Fannie Mae's Perspective (Viewgraphs only)

Author: Desiderio, M.

Pages/Volumes: 15 pp.

Publication Year: 2001

Notes: Presentations from the Building America Update Workshop, 10-11 April 2001, Washington, DC.

Subject Category: System Engineering Research

Document Type: Presentations

Abstract: Mission of Fannie Mae, partnership between NAHB and Fannie Mae, how Fannie Mae encourages energy efficiency in home building, its relationship to Building America.

Report Number: PR-610-30957

[PDF 197 KB](#)

Title: Community Energy Efficiency Program (Viewgraphs only)

Author: Hodgson, M.

Pages/Volumes: 10 pp.

Publication Year: 2001

Notes: Presentations from the Building America Update Workshop, 10-11 April 2001, Washington, DC.

Subject Category: System Engineering Research

Document Type: Presentations

Abstract: Description of the Community Energy Efficiency Program of Building America, their requirements, local benefits of "green" building, and builders protocols.

Report Number: PR-610-30959

Ventilation Systems

[PDF 2.0 MB](#)

Title: Ventilation System Installation and Commissioning Guide.

Pages/Volumes: 6 pp

Publication Year: 2004

Notes: Posted on this site with permission from IBACOS.

Subject Category: Ventilation Systems

Document Type: Design Guides

Abstract: This guide has been developed to assist in the installation and commissioning of supply ventilation systems using the AirCycler by Lipidex and a motorized damper by Duro Dyne. This guide has been developed based on some of the field problems encountered with the integration of the AirCycler and the Duro Dyne damper systems.

Report Numbers: 35395

[PDF 593 KB](#)

Title: Infiltration and Natural Ventilation Model for Whole-Building Energy Simulation of Residential Buildings: Preprint

Author: Deru, M.; Burns, P.

Pages/Volumes: 23 pp.

Publication Year: 2003

Notes: Prepared for the ASHRAE Conference, 28 June-2 July 2003, Kansas City, Missouri

Subject Category: Ventilation Systems

Document Type: Technical Reports

NTIS/GPO Number: 15003730

Abstract: The infiltration term in the building energy balance equation is one of the least understood and most difficult to model. For many residential buildings, which have an energy performance dominated by the envelope, it can be one of the most important terms. There are numerous airflow models; however, these are not combined with whole-building energy simulation programs that are in common use in North America. This paper describes a simple multizone nodal airflow model integrated with the SUNREL whole-building energy simulation program.

Report Number: CP-550-33698

[PDF 1.2 MB](#)

Title: Improving Fan System Performance: A Sourcebook for Industry

Pages/Volumes: 92 pp.

Publication Year: 2003

Subject Category: Heating Systems; Cooling Systems; Ventilation Systems

Document Type: Design Guides

NTIS/GPO Number: 15003715

Abstract: This is one of a series of sourcebooks on motor-driven equipment produced by the Industrial Technologies Program. It provides a reference for industrial fan systems users, outlining opportunities to improve fan system performance.

Report Numbers: BK-810-29166; DOE/GO-102003-1294

[PDF 693 KB](#)

Title: The How and Why of Your High Performance HVAC System

Author: Building Science Consortium

Pages/Volumes: 1 pp.

Publication Year: 2002

Notes: Posted on this site with permission from Building Science Consortium.

Subject Category: Ventilation Systems

Document Type: Bulletins

Abstract: Perhaps the most frequently raised concern from the home owners of high performance homes is: How can I be saving energy, money, and wear and tear on my equipment if it seems as though my system is running a lot more than systems in other homes? The neat thing about the answer to this question is that your high performance home not only is saving you energy, money, and equipment life; it's also delivering more comfort, health, and safety to boot. And you cannot split the pieces of your system up—it's an all-or-nothing performance package. Here is how and why it works for you.

Report Number: 35009

[PDF 30 KB](#)

Title: Procedures for Residential Mechanical Ventilation

Author: ConSol Energy Consultants

Pages/Volumes: 3 pp.

Publication Year: 1998

Notes: Posted on this site with permission from ConSol.

Subject Category: Ventilation Systems

Document Type: Bulletins

Abstract: Better construction practices result in tighter homes with significantly reduced air infiltration.

Report Number: 34957

[PDF 400 KB](#)

Title: Whole-House Ventilation Systems: Improved Control of Air Quality. Building Technologies Program, Office of Energy Efficiency and Renewable Energy (EERE) (Brochure).

Pages/Volumes: 6 pp.

Publication Year: 2002

Subject Category: Ventilation Systems

Document Type: Bulletins

NTIS/GPO Number: 15002860

Abstract: Fact sheet for homeowners and contractors on how to employ spot ventilation in the home for comfort and safety.

Report Numbers: BR-840-26458; DOE/GO-102002-0778

[PDF 256 KB](#)

Title: Spot Ventilation: Source Control to Improve Indoor Air Quality. Building Technologies Program, Office of Energy Efficiency and Renewable Energy (EERE) (Brochure).

Pages/Volumes: 4 pp.

Publication Year: 2002

Subject Category: Ventilation Systems

Document Type: Bulletins

NTIS/GPO Number: 15002861

Abstract: Fact sheet for homeowners and contractors on how to employ spot ventilation in the home for comfort and safety.

Report Numbers: BR-840-26466; DOE/GO-102002-0786

[PDF 1.1 MB](#)

Title: HVAC: 'V' stands for 'Ventilation'

Author: Andrews, S.

Source: HomeBuilder Magazine. Vol. 41(12) December 2002

Pages/Volumes: pp. 7, 8, 10, 33, 37

Publication Year: 2002

Notes: Posted on this Web site with permission from Homebuilder magazine.

Subject Category: Ventilation Systems

Document Type: Magazine/Newspaper Articles

Abstract: Every systems-built home needs an effective ventilation system. The essentials include combustion safety, moisture management, good thermal performance of the shell, and whole-house mechanical ventilation.

Report Number: 33276

[PDF 789 KB](#)

Title: Residential Ventilation and Latent Loads

Author: Lstiburek, J.

Source: ASHRAE Journal. Vol. 44(4) April 2002

Pages/Volumes: pp. 18-21

Publication Year: 2002

Notes: The following article was published by ASHRAE as part of the ASHRAE Journal (April 2002). © 2002 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. This posting is by permission of ASHRAE and is presented for educational purposes only. ASHRAE does not endorse or recommend commercial products or services. This article may not be copied and/or distributed electronically or in paper form without permission of ASHRAE. Contact ASHRAE at www.ashrae.org.

Subject Category: Ventilation Systems

Document Type: Technical Reports

Abstract: Most houses in hot, humid climates are over-ventilated because of duct leakage and induced-air change from internal air pressure effects from unbalanced air flow and door closure.

Report Number: 33076

[PDF 450 KB](#)

Title: Barriers to Improved Ventilation in Production Housing: Preprint

Author: Barley, C. D.

Pages/Volumes: 9 pp.

Publication Year: 2002

Notes: Prepared for the International Academy of Indoor Air Sciences, Indoor Air 2002 Conference, 30 June - 5 July 2002, Monterey, California

Subject Category: Ventilation Systems

Document Type: Technical Reports

NTIS/GPO Number: 15000293

Abstract: In addressing the goals of energy-efficiency and indoor air quality (IAQ) in homes, industry teams in the U.S. Department of Energy's Building America program are installing mechanical ventilation systems in tight homes.

Report Number: CP-550-31665

[PDF 405 KB](#)

Title: Overview of Residential Ventilation Activities in the Building America Program (Phase I)

Author: Barley, D.

Pages/Volumes: 32 pp.

Publication Year: 2001

Subject Category: Ventilation Systems

Document Type: Technical Reports

Abstract: This report provides an overview of issues involved in residential ventilation; provides an overview of the various ventilation strategies being evaluated by the five teams, or consortia, currently involved in the Building America Program; and identifies unresolved technical issues.

Report Number: TP-550-30107

[PDF 679 KB](#)

Title: The Residential Ventilation Standard

Author: Sherman, M.

Source: Environmental Energy Technologies Division News (EETD News). Vol. 2(3) Spring 2001

Pages/Volumes: pp. 6-7

Publication Year: 2001

Publisher, Place: Berkeley, CA: Lawrence Berkeley National Laboratory

Notes: Posted with permission.

Subject Category: Ventilation Systems

Document Type: Technical Reports

Abstract: The author is Chair of ASHRAE's Standard Project Committee 62.2, which is reviewing public comments on the ventilation standard's first draft. This article describes the general outline of the draft's contents.

Report Number: JA-610-30984

[PDF 240 KB](#)

Title: Whole House Fan: How to Install and Use a Whole House Fan. Office of Building Technology, State and Community Programs (BTS) Technology Fact Sheet.

Pages/Volumes: 4 pp.

Publication Year: 1999

Subject Category: Ventilation Systems

Document Type: Bulletins

Abstract: An informational fact sheet about the energy-cost benefits of a whole house fan, installation tips, and selection criteria.

Report Numbers: BR-330-26291; DOE/GO-10099-745

[PDF 2.1 MB](#)

Title: Design/Sizing Methodology and Economic Evaluation of Central-Fan-Integrated Supply Ventilation System

Author: Rudd, A. F.

Source: Proceedings of the ACEEE 1998 Summer Study of Energy Efficiency in Buildings, 23-28 August 1998, Washington, DC.

Pages/Volumes: 15 pp.

Publication Year: 1998

Publisher, Place: Washington, DC: American Council for an Energy-Efficient Economy (ACEEE)

Notes: Posted with permission from American Council for an Energy-Efficient Economy.

Subject Category: Ventilation Systems

Document Type: Technical Reports

Abstract: An effective ventilation system can be achieved using a 5" to 9" diameter insulated duct from outdoors to the return side of a central air distribution fan, with a specialized fan control that automatically cycles the fan if the fan has been inactive for a period of time.

Report Number: JA-610-30973

[PDF 1.5 MB](#)

Title: Comparative Ventilation System Evaluations

Author: Holton, J. K.; Kokayko, M. J.; Beggs, T. R.

Source: ASHRAE Transactions. Vol. 103(1) 1997

Pages/Volumes: pp. 675-692

Publication Year: 1997

Notes: The following article was published in ASHRAE Transactions. Copyright 1997 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. This posting is by permission of ASHRAE and is presented for education purposes only. ASHRAE does not endorse or recommend commercial products or services. This article may not be copied and/or distributed electronically or in paper form without permission of ASHRAE. Contact ASHRAE at www.ashrae.org.

Subject Category: Ventilation Systems

Document Type: Technical Reports

Abstract: A home-building research and development consortium developed improved methods of home construction. In developing the technical package for these houses, it was realized that construction a test model would be valuable, especially if a comparable "baseline" house of standard construction could be build immediately adjacent to the test model. This was done in suburban Pittsburgh.

Report Number: JA-610-30937

Other

[PDF 5.1 MB](#)

Title: Gas-Fired Distributed Energy Resource Technology Characterizations.

Author: Goldstein, L.; Hedman, B.; Knowles, D.; Freedman, S. I.; Woods, R.; Schweizer, T.

Pages/Volumes: 226 pp.

Publication Year: 2003

Notes: A joint project of the Gas Research Institute (GRI) and the National Renewable Energy Laboratory.

Subject Category: Distributed Energy and Electricity Reliability; Crosscutting; Onsite Power Systems

Document Type: Technical Report; Subcontract Report; Technical Reports

NTIS/GPO Number: 15005819

Abstract: The U. S. Department of Energy (DOE) Office of Energy Efficiency and Renewable Energy (EERE) is directing substantial programs in the development and encouragement of new energy technologies. Among them are renewable energy and distributed energy resource technologies. As part of its ongoing effort to document the status and potential of these technologies, DOE EERE directed the National Renewable Energy Laboratory to lead an effort to develop and publish Distributed Energy Technology Characterizations (TCs) that would provide both the department and energy community with a consistent and objective set of cost and performance data in prospective electric-power generation applications in the United States. Toward that goal, DOE/EERE - joined by the Electric Power Research Institute (EPRI) - published the Renewable Energy Technology Characterizations in December 1997. As a follow-up, DOE EERE - joined by the Gas Research Institute - is now publishing this document, Gas-Fired Distributed Energy Resource Technology Characterizations.

Report Numbers: TP-620-34783

Title: Optimal Building Designs on the Path to Zero Net Energy.

Author: Christensen, C.; Barker, G.; Tupper, K.

Source: Proceedings of the Solar 2004 Conference Including Proceedings of 33rd ASES Annual Conference and Proceedings of 29th National Passive Solar Conference, 11-14 July 2004, Portland, Oregon.

Pages/Volumes: pp. 883-888

Editor: Campbell-Howe, R. ed.

Publication Year: 2004

Publisher, Place: Boulder, CO: American Solar Energy Society (ASES)

Subject Category: Performance Analysis and Tests; Onsite Power Systems

Document Type: Technical Reports

Report Numbers: CP-550-36100

[PDF 529 KB](#)

Title: Moving Toward Zero Energy Homes in California: "Green" House Effect Makes Sense in the Golden State. Building America (Brochure).

Pages/Volumes: 4 pp.

Publication Year: 2004

Subject Category: Onsite Power Systems; Hot-Dry Climate

Document Type: Project Summaries

NTIS/GPO Number: 15011457

Abstract: This brochure describes The New American Home, an annual project that is focused on the future of homebuilding. Industry experts team to design, build, and monitor a demonstration home that has been equipped with the latest marketable technologies and projects.

Report Numbers: BR-550-37320; DOE/GO-102004-2039

[PDF 360 KB](#)

Title: Technology Characterization: Steam Turbines.

Author: Energy Nexus Group

Pages/Volumes: 20 pp.

Publication Year: 2002

Notes: This work was prepared for the Environmental Protection Agency, Climate Protection Partnership Division, Washington, DC.

Subject Category: Onsite Power Systems

Document Type: Technical Reports

Abstract: Steam turbines are one of the most versatile and oldest prime mover technologies still in general production. Power generation using steam turbines has been in use for about 100 years, when they replaced reciprocating steam engines due to their higher efficiencies and lower costs. Conventional steam turbine power plants generate most of the electricity produced in the United States. The capacity of steam turbines can range from 50 kW to several hundred MWs for large utility power plants. Steam turbines are widely used for combined heat and power (CHP) applications.

Report Numbers: 37829

[PDF 304 KB](#)

Title: Technology Characterization: Reciprocating Engines.

Author: Energy Nexus Group

Pages/Volumes: 30 pp.

Publication Year: 2002

Subject Category: Onsite Power Systems

Document Type: Technical Reports

Abstract: Reciprocating internal combustion engines are a widespread and well-known technology. North American production exceeds 35 million units per year for automobiles, trucks, construction and mining equipment, marine propulsion, lawn care, and a diverse set of power generation applications. A variety of stationary engine products are available for a range of power generation market applications and duty cycles including standby and emergency power, peaking service, intermediate and baseload power, and combined heat and power (CHP). Reciprocating engines are available for power generation applications in sizes ranging from a few kilowatts to over 5 MW. There are two basic types of reciprocating engines—spark ignition (SI) and compression ignition (CI). Spark ignition engines for power generation use natural gas as the preferred fuel, although they can be set up to run on propane, gasoline, or landfill gas. Compression ignition engines (often called diesel engines) operate on diesel fuel or heavy oil, or

they can be set up to run in a dual-fuel configuration that burns primarily natural gas with a small amount of diesel pilot fuel.

Report Numbers: 37828

[PDF 166 KB](#)

Title: Technology Characterization: Gas Turbines.

Author: Energy Nexus Group

Pages/Volumes: 27 pp.

Publication Year: 2002

Notes: This work was prepared for the Environmental Protection Agency, Climate Protection Partnership Division, Washington, DC.

Subject Category: Onsite Power Systems

Document Type: Technical Reports

Abstract: Gas turbines produce high-quality exhaust heat that can be used in CHP configurations to reach overall system efficiencies (electricity and useful thermal energy) of 70 to 80%. By the early 1980s, the efficiency and reliability of smaller gas turbines (1 to 40 MW) had progressed sufficiently to be an attractive choice for industrial and large institutional users for CHP applications. Gas turbines are one of the cleanest means of generating electricity, with emissions of oxides of nitrogen (NO_x) from some large turbines in the single-digit parts per million (ppm) range, either with catalytic exhaust cleanup or lean pre-mixed combustion. Because of their relatively high efficiency and reliance on natural gas as the primary fuel, gas turbines emit substantially less carbon dioxide (CO₂) per kilowatt-hour (kWh) generated than any other fossil technology in general commercial use.

Report Numbers: 37827

[PDF 192 KB](#)

Title: Technology Characterization: Microturbines.

Author: Energy Nexus Group

Pages/Volumes: 27 pp.

Publication Year: 2002

Subject Category: Onsite Power Systems

Document Type: Technical Reports

Abstract: Microturbines are small electricity generators that burn gaseous and liquid fuels to create high-speed rotation that turns an electrical generator. Today's microturbine technology is the result of development work in small stationary and automotive gas turbines, auxiliary power equipment, and turbochargers, much of which was pursued by the automotive industry beginning in the 1950s. Microturbines entered field testing around 1997 and began initial commercial service in 2000.

Report Numbers: 37804

[PDF 4.0 MB](#)

Title: Builder Product Choices for High-Performance Homes. Published in Home Builder Magazine.

Author: Andrews, S.

Pages/Volumes: 6 pp.

Publication Year: 2004

Subject Category: Cost-Performance Tradeoffs

Document Type: Magazine/Newspaper Articles

Abstract: From the get-go, builders of systems-built, high-performance homes—in which the focus is on comfort, durability, indoor health and efficiency—seem forced to both make more key changes and make them faster than their competitors. What follows is a list of products and a couple of processes that individual builders of high-performances homes selected to make their homes work better.

Report Numbers: 37798

[PDF 4.0 MB](#)

Title: McStain's Excellent Adventure. Published in the July 2004 Home Builder Magazine.

Author: Andrews, S.

Pages/Volumes: 5 pp.

Publication Year: 2004

Subject Category: Cold Climate

Document Type: Magazine/Newspaper Articles

Abstract: Every few years, McStain Neighborhoods push the envelope by building a home with cutting-edge technologies. This year's "Discovery Home" is the latest example, and a very

successful one at that. The home earned 458 points on the Built Green checklist—the most points of any home every evaluated for the Built Green program of Colorado. It scored 93 points on E-Star's 0-to-100 Home Energy Rating Scale, one of the handful of highest scores earned to date.

Report Numbers: 37797

[PDF 3.0 MB](#)

Title: When will world oil production peak? Article from the September 2004 Home Builder magazine.

Author: Andrews, S.

Pages/Volumes: 2

Publication Year: 2004

Subject Category: Cost-Performance Tradeoffs

Document Type: Magazine/Newspaper Articles

Abstract: Peak oil is a term that describes the era when daily oil extraction from a particular area—an oil field, a nation, or in this case the world—reaches an all-time high, a peak. Thereafter we won't run out of oil—we'll still be pumping some oil in 2100. But daily oil will plateau, then slip into decline. A growing population then competes for a shrinking supply.

Report Numbers: 37796

[PDF 2.2 MB](#)

Title: Renewable Energy and Energy Efficiency Technologies in Residential Building Codes: June 15, 1998 to September 15, 1998.

Author: Wortman, D.; Echo-Hawk, L.

Pages/Volumes: 170 pp.

Publication Year: 2005

Notes: Work performed by Wortman Engineering, Boulder, Colorado.

Subject Category: Other

Document Type: Technical Reports

Abstract: This report is an attempt to describe the building code requirements and impediments to the application of EE and RE technologies in residential buildings. Several modern model building codes were reviewed. These are representative of the codes that will be adopted by most locations in the coming years. The codes reviewed for this report include: International Residential Code, First Draft, April 1998; International Energy Conservation Code, 1998; International Mechanical Code, 1998; International Plumbing Code, 1997; International Fuel Gas Code, 1997; National Electrical Code, 1996. These codes were reviewed as to their application to (1) PV systems in buildings and building-integrated PV systems and (2) active solar domestic hot water and space-heating systems. A discussion of general code issues that impact these technologies is also included. Examples of this are solar access and sustainability.

Report Numbers: SR-550-32688

[PDF 737 KB](#)

Title: Building America Research Benchmark Definition, Version 3.1, Updated July 14, 2004.

Author: Hendron, R.

Pages/Volumes: 40 pp.

Publication Year: 2005

Abstract: To track progress toward aggressive multi-year whole-house energy savings goals of 40-70% and onsite power production of up to 30%, the U.S. Department of Energy (DOE) Residential Buildings Program and the National Renewable Energy Laboratory (NREL) developed the Building America Research Benchmark in consultation with the Building America industry teams. The Benchmark is generally consistent with mid-1990s standard practice, as reflected in the Home Energy Rating System (HERS) Technical Guidelines (RESNET 2002), with additional definitions that allow the analyst to evaluate all residential end-uses, an extension of the traditional HERS rating approach that focuses on space conditioning and hot water. A series of user profiles, intended to represent the behavior of a "standard" set of occupants, was created for use in conjunction with the Benchmark.

Report Numbers: TP-550-36429

[PDF 487 KB](#)

Title: Building America Puts Residential Research Results to Work. Building America Research that Works (Fact Sheet).

Pages/Volumes: 4 pp.

Publication Year: 2004

Subject Category: Cost-Performance Tradeoffs

Document Type: Program Summaries

NTIS/GPO Number: 15008862

Abstract: Residential buildings use more than 20% of the energy consumed annually in the United States. To help reduce that energy use, the Department of Energy (DOE) and its Building America partners conduct research to develop advanced building energy systems that make homes and communities much more energy-efficient. DOE and its partners design, build, and evaluate attractive, comfortable homes that increase performance with little or no increase in construction costs.

Report Numbers: BR-550-35851; DOE/GO-102004-1922

[**PDF 2.4 MB**](#)

Title: Building America Performance Analysis Procedures: Revision 1.

Author: Hendron, R.; Anderson, R.; Judkoff, R.; Christensen, C.; Eastment, M.; Norton, P.; Reeves, P.; Hancock, E.

Pages/Volumes: 151 pp.

Publication Year: 2004

Subject Category: Performance Analysis and Tests

Document Type: Technical Reports

NTIS/GPO Number: 15007873

Abstract: To measure progress toward multi-year Building America research goals, cost and performance trade-offs are evaluated through a series of controlled field and laboratory experiments supported by energy analysis techniques that use test data to "calibrate" energy simulation models. This report summarizes the guidelines for reporting such analytical results using the Building America Research Benchmark (Version 3.1) in studies that also include consideration of current Regional and Builder Standard Practice. Version 3.1 of the Benchmark is generally consistent with the 1999 Home Energy Rating System (HERS) Reference Home, with additions that allow evaluation of all home energy uses.

Report Numbers: TP-550-35567

[**PDF 482 KB**](#)

Title: Comparative Analysis of Homebuyer Response to New Zero-Energy Homes: Preprint.

Author: Farhar, B. C.; Coburn, T. C.; Murphy, M.

Pages/Volumes: 16 pp.

Publication Year: 2004

Notes: Prepared for the ACEEE Summer Study on Energy Efficiency in Buildings, 22-27 August 2004, Pacific Grove, California

Subject Category: Onsite Power Systems; Cost-Performance Tradeoffs

Document Type: Technical Reports

NTIS/GPO Number: 15008798

Abstract: In 2004, mail questionnaires were sent to 271 homebuyers in a highly energy-efficient community and 98 homebuyers living in an adjacent conventional community. People surveyed had to have lived in their homes for at least 6 months. The questionnaires addressed perceptions and preferences relative to the new home purchases, and the role, if any, that energy efficiency and solar features might have played in these purchases. Also investigated was the willingness to pay for energy features; preferences on whether energy features should be standard or optional; preferences on energy policies; perceived problems; aesthetics; homebuyer satisfaction and the reasons for it; environmentalism; and experience with the utility company.

Report Numbers: CP-550-35912

[**PDF 575 KB**](#)

Title: Development of an Energy Savings Benchmark for All Residential End-Uses: Preprint.

Author: Hendron, R.; Anderson, R.; Christensen, C.; Eastment, M.; Reeves, P.

Pages/Volumes: 11 pp.

Publication Year: 2004

Notes: Prepared for the SIMBUILD2004 Conference, 4-6 August 2004, Boulder, Colorado

Subject Category: Performance Analysis and Tests

Document Type: Technical Reports

NTIS/GPO Number: 15009700

Abstract: To track progress toward aggressive multi-year whole-house energy savings goals of 40-70% and onsite power production of up to 30%, the U.S. Department of Energy (DOE) Residential Buildings Program and the National Renewable Energy Laboratory (NREL) developed the Building America Research Benchmark in 2003. The Benchmark is generally consistent with

mid-1990s standard practice, as reflected in the Home Energy Rating System (HERS) Technical Guidelines, with additional definitions that allow the analyst to evaluate all residential end-uses, an extension of the traditional HERS rating approach that focuses on space conditioning and hot water. A series of user profiles, intended to represent the behavior of a "standard" set of occupants, was created for use in conjunction with the Benchmark. Finally, a set of tools was developed by NREL and other Building America partners to help analysts compare whole-house energy use for a Prototype house to the Benchmark in a fair and consistent manner.

Report Numbers: CP-550-35917

[PDF 529 KB](#)

Title: Moving Toward Zero Energy Homes in California: "Green" House Effect Makes Sense in the Golden State. Building America (Brochure).

Pages/Volumes: 4 pp.

Publication Year: 2004

Abstract: This brochure describes The New American Home, an annual project that is focused on the future of homebuilding. Industry experts team to design, build, and monitor a demonstration home that has been equipped with the latest marketable technologies and projects.

Report Numbers: BR-550-37320; DOE/GO-102004-2039

[PDF 1.2 MB](#)

Title: Whole-House Approach Benefits Builders, Buyers, and the Environment. Building Technologies Program Brochure.

Pages/Volumes: 8 pp.

Publication Year: 2004

Subject Category: Cost-Performance Tradeoffs

Document Type: Program Summaries

NTIS/GPO Number: 15009938

Abstract: The U.S. Department of Energy's (DOE) Building America Program is reengineering new and existing American homes for energy efficiency, energy security, and affordability. Building America works with the residential building industry to develop and implement innovative building energy systems—innovations that save builders and homeowners millions of dollars in construction and energy costs.

Report Numbers: BR-550-34867; DOE/GO-102004-2014

[PDF 1.8 MB](#)

Title: BSC Final Report: Lessons Learned from Building America Participation, February 1995 - December 2002.

Pages/Volumes: 36 pp.

Publication Year: 2004

Subject Category: Cost-Performance Tradeoffs

Document Type: Project Summaries

NTIS/GPO Number: 15007394

Abstract: Over the past 5 years under the Building America program, the Building Science Consortium has worked with more than 25 builders in 121 developments, in 18 states, and in all six climate zones. This work has resulted in more than 7,000 ENERGY STARTM homes built as of August 2002.

Report Numbers: SR-550-35915

[No PDF](#)

Title: Consumptive Water Use for U.S. Power Production. Paper No. 4677.

Author: Torcellini, P. A.; Long, N.; Judkoff, R.

Source: ASHRAE Transactions: Research. Technical and Symposium Papers from the 2004 Winter Meeting of the American Society of Heating, Refrigerating and Air-Conditioning Engineers, January 2004, Anaheim, California.

Pages/Volumes: Vol. 110, Part 1: pp. 96-100

Publication Year: 2004

Publisher, Place: Atlanta, GA: American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)

Notes: For preprint version including online full-text document, see NREL/CP-550-35190.

Subject Category: Cost-Performance Tradeoffs

Document Type: Technical Reports

Report Numbers: CP-550-31253

[PDF 2.1 MB](#)

Title: Green Power Marketing in the United States: A Status Report; Seventh Edition.

Author: Bird, L.; Swezey, B.

Pages/Volumes: 85 pp.

Publication Year: 2004

Subject Category: Onsite Power Systems; Crosscutting; Biomass; Distributed Energy and Electricity Reliability; Geothermal Technologies; Solar Energy Technologies; Wind and Hydropower Technologies

Document Type: Technical Reports; Technical Report

NTIS/GPO Number: 15009706

Abstract: Voluntary consumer decisions to purchase electricity supplied from renewable energy sources represent a powerful market support mechanism for renewable energy development. Beginning in the early 1990s, a small number of U.S. utilities began offering "green power" options to their customers. Since then, these products have become more prevalent both from utilities and in states that have introduced competition into their retail electricity markets. Today, more than 50% of all U.S. consumers have an option to purchase some type of green power product from a retail electricity provider. This report provides an overview of green power marketing activity in the United States. The first section provides an overview of green power markets, consumer response, and recent industry trends. Section 2 provides brief descriptions of the utility green pricing programs available nationally. Section 3 describes companies that actively market green power in competitive markets and those that market renewable energy certificates nationally or regionally. The last section provides information on a select number of large, nonresidential green power purchasers, including governmental agencies, universities, and businesses.

Report Numbers: TP-620-36823

[PDF 1.1 MB](#)

Title: IBACOS Builder System Performance Packages: January 2003 to December 2003.

Author: Broniek, J.

Pages/Volumes: 42 pp.

Publication Year: 2004

Notes: Work performed by IBACOS, Pittsburgh, Pennsylvania.

Subject Category: Cost-Performance Tradeoffs

Document Type: Project Summaries

NTIS/GPO Number: 15008048

Abstract: This report presents system design packages for cold and mixed-humid climates. Builders and contractors can use these design packages to construct homes that achieve a Home Energy Rating System (HERS) score between 86 and 88. This represents a reduction in space-conditioning and domestic hot-water energy consumption of between 30% and 40%, compared to a similar home built to meet the 1993 Model Energy Code. The six different design packages, three for each climate zone, give the builder flexibility in their design strategy by allowing them to choose the most cost-effective approach. The recommendations presented in these design packages are based on more than 10 years of experience that IBACOS has had working with builders throughout the United States on Building America projects.

Report Numbers: SR-550-34007

[PDF 122 KB](#)

Title: Sealed-Attic Retrofit.

Author: Home Energy Magazine

Pages/Volumes: 1 pp

Publication Year: 2004

Notes: Posted on this site with permission from Home Energy Magazine.

Subject Category: Envelope and Window Systems; Hot-Dry Climate

Document Type: Magazine/Newspaper Articles

Abstract: The principles behind a sealed-attic retrofit are pretty simple. You need to seal all the vents and other leaks between the attic and outside, and then put insulation on the roof instead of the house ceiling. It is the details that are hard to get right.

Report Numbers: 36477

[PDF 1. 9 MB](#)

Title: Van Geet Off-Grid Home: An Integrated Approach to Energy Savings.

Author: Barley, C. D.; Torcellini, P.; Van Geet, O.

Pages/Volumes: 68 pp.

Publication Year: 2004

Subject Category: Onsite Power Systems

Document Type: Technical Reports

NTIS/GPO Number: 15009622

Abstract: The Van Geet home near Denver, Colorado, exemplifies the effectiveness of coupling energy conservation measures with renewable energy utilization in a modern residence. The remote location, with no utility connections available, and the owner's interest in renewable energy motivated the ambitious design. This design attracted the interest of the Building America (BA) program and was studied as a research home. As a result, the BA program provided energy engineering throughout the design, construction, and performance evaluation phases. The American Society of Heating, Refrigerating, and Air-conditioning Engineers (ASHRAE) also recognized the success of this project by awarding it an ASHRAE Technology Award in 2001.

Report Numbers: TP-550-32765

[PDF 465 KB](#)

Title: Northern Texas Builds Its First Zero Energy Home. Building America (Fact Sheet).

Pages/Volumes: 2 pp.

Publication Year: 2004

Subject Category: Onsite Power Systems

Document Type: Program Summaries

NTIS/GPO Number: 15009943

Abstract: This fact sheet describes the first Zero Energy Home built in northern Texas. It describes the energy efficiency features and their advantages.

Report Numbers: FS-550-36790; DOE/GO-102004-1998

[PDF 2.1 MB](#)

Title: The reHABITAT Guide: For Energy- and Resource-Efficient Retrofit Strategies; February 2003 - February 2004.

Pages/Volumes: 76 pp.

Publication Year: 2004

Notes: Work performed by Consortium for Advanced Residential Buildings (CARB), Norwalk, Connecticut.

Subject Category: Envelope and Window Systems

Document Type: Bulletins

NTIS/GPO Number: 15007934

Abstract: The reHABITAT Guide for Energy- and Resource-Efficient Retrofit Strategies seeks to advance the goal of the U.S. Department of Energy's Existing Residential Buildings Program (ERBP): to develop approaches that will enable the housing retrofit industry to deliver energy-efficient housing improvements and to ensure that energy-efficient retrofit technologies incorporated into projects are viable over conventional approaches. This guide was developed for Habitat for Humanity International and is the result of lessons learned from demonstration retrofit projects undertaken by Habitat for Humanity affiliates in Newburgh, New York; Baltimore, Maryland; and Philadelphia, Pennsylvania; with building systems consulting and technical assistance provided by Steven Winter Associates, Inc. (SWA).

Report Numbers: SR-550-36057

[PDF 2.1 MB](#)

Title: Strategies for Energy-Efficient Remodeling: SEER 2003 Case Study Report; February 27, 2003 - October 31, 2004.

Author: Drumheller, S. C.; Wiehagen, J.

Pages/Volumes: 32 pp.

Publication Year: 2004

Subject Category: Retrofit Research; Cold Climate

Document Type: Technical Reports

Abstract: The goal of the Strategies for Energy Efficiency in Remodeling (SEER) project is to provide information, based on research and case studies, to remodelers and consumers about opportunities to increase home energy performance. Opportunities to include energy efficiency often arise while undertaking general remodeling work. This case study report examines the technologies, methods, and installation of specific energy efficiency strategies. The information

presented here stems from a "gut rehab" of a house in rural New Jersey as part of the SEER project through the Building America Existing Buildings Program.

Report Numbers: SR-550-36474

[PDF 898 KB](#)

Title: Trends in Utility Green Pricing Programs (2003).

Author: Bird, L.; Cardinal, K.

Pages/Volumes: 40 pp.

Publication Year: 2004

Subject Category: Onsite Power Systems; Crosscutting; Biomass; Distributed Energy and Electricity Reliability; Geothermal Technologies; Solar Energy Technologies; Wind and Hydropower Technologies

Document Type: Technical Reports; Technical Report

NTIS/GPO Number: 15009681

Abstract: Utilities first began offering consumers a choice of purchasing electricity generated from renewable energy sources in the early 1990s. Since then, the number of U.S. utilities offering green pricing programs has steadily grown. Today, more than 500 utilities in regulated electricity markets—or about 16% of all utilities nationally—offer their customers green power options. Because some of these utilities offer programs in conjunction with cooperative associations or other public power entities, the number of distinct programs is slightly more than 100. Through these programs, more than 33 million customers spanning 34 states have the ability to purchase renewable energy to meet some portion or all of their electricity needs, or make contributions to support the development of renewable energy resources. Typically, customers must pay a premium above standard electricity rates for this service. This report presents year-end 2003 data on utility green pricing programs, and examines trends in consumer response and program implementation over time. The data provided in this report can be used by utilities as benchmarks by which to gauge the success of their green power programs.

Report Numbers: TP-620-36833

[PDF 63 KB](#)

Title: A Community Guide to Basic and Cost-Saving Construction in the American Southwest.

Publication Year: 2004

Abstract: This report incorporates residential energy system research results from the Building America Program and was prepared by HUD's PATH program. HUD's Partnership for Advancing Technology (PATH) is a public-private initiative dedicated to accelerating the development and use of housing technologies that improve the quality, durability, energy efficiency, environmental performance, and affordability of housing. The support provided by HUD and the PATH program for strategic multi-agency coordination on housing issues is gratefully acknowledged. Hard copies of this report can be ordered from HUD by visiting

www.huduser.org/publications/destech/cost_saving.html

Report Numbers: 36395

[PDF 1.1 MB](#)

Title: New American Home® 2004: Las Vegas, Nevada. Building America Research that Works, Building Technology Program (Brochure).

Pages/Volumes: 6 pp.

Publication Year: 2003

Subject Category: Hot-Dry Climate

Document Type: Project Summaries

NTIS/GPO Number: 15005917

Abstract: The New American Home is an annual showcase project co-sponsored by the National Association of Home Builders' National Council of the Housing Industry and Builder Magazine. Merlin Contracting built this year's home in the Sahara Lake community, just west of downtown Las Vegas.

Report Numbers: BR-550-33600; DOE/GO-102003-1837

[PDF 844 KB](#)

Title: Results from IBACOS Building-Scale Projects: Conference or Journal Paper.

Author: Grisolia, A.

Pages/Volumes: 28 pp

Publication Year: 2003

Subject Category: Cold Climate

Document Type: Program Summaries

Abstract: This report presents a case study of work with Jayar Construction in the Summerset at Frick Park community in Pittsburgh, Pennsylvania. The report includes advanced housing technologies, systems engineering results, project benefits, lessons learned, and cost and performance trade-offs.

Report Numbers: 34791

[PDF 461 KB](#)

Title: Quality Home Newsletter July 2003.

Author: Hunt, S.

Pages/Volumes: 6 pp

Publication Year: 2003

Notes: Posted on this site with permission from IBACOS.

Subject Category: Hot Water Systems

Document Type: Design Guides

Abstract: Energy-efficiency is a by-product of deliberately building quality homes - homes that are safe, healthy, durable, comfortable, and efficient. Building homes to reach high levels of energy efficiency, Energy Star or above, involves changes in a builder's practices. But the benefits to making these changes can dramatically increase the quality and performance of the homes, which in turn, will reduce callbacks, customer complaints, and liability. No matter the quality and performance of a builder's current product, some changes in material, installation, and quality assurance will be necessary to achieve new levels of performance. This doesn't mean that increasing energy efficiency needs to lead to headaches or increased cost. It does mean that the builder has to embark on a deliberate process of planning, design, and testing to understand the necessary changes, to the trades, and ensure that the changes are being appropriately implemented.

Report Numbers: 35664

[PDF 918 KB](#)

Title: Moving Toward Zero Energy Homes: Armory Park del Sol, Tucson, Arizona (Fact Sheet).

Pages/Volumes: 2 pp.

Publication Year: 2003

Subject Category: Onsite Power Systems

Document Type: Technical Reports

NTIS/GPO Number: 15006102

Abstract: Fact sheet describes the energy efficient and solar energy features of the Armory Park del Sol Zero Energy Home, participant in the Zero Energy Homes initiative.

Report Numbers: FS-550-35302; DOE/GO-102003-1829

[PDF 712 KB](#)

Title: Moving Toward Zero Energy Homes: Lakeside, Elk Grove, California (Fact Sheet).

Pages/Volumes: 2 pp.

Publication Year: 2003

Subject Category: Onsite Power Systems

Document Type: Technical Reports

NTIS/GPO Number: 15006104

Abstract: Fact sheet describes the energy efficient and solar energy features of the Lakeside Zero Energy Home, participant in the Zero Energy Homes initiative.

Report Numbers: FS-550-35306; DOE/GO-102003-1832

[PDF 1.1 MB](#)

Title: Moving Toward Zero Energy Homes: The Ultimate Family Home, Las Vegas, Nevada (Brochure).

Pages/Volumes: 4 pp.

Publication Year: 2003

Subject Category: Onsite Power Systems

Document Type: Technical Reports

NTIS/GPO Number: 15006105

Abstract: Brochure describes the energy efficient and solar energy features of the Ultimate Family Home Zero Energy Home, participant in the Zero Energy Homes initiative.

Report Numbers: BR-550-35316; DOE/GO-102003-1827

[PDF 718 KB](#)

Title: Moving Towards Zero Energy Homes: Vista Montana, Watsonville, California (Fact Sheet).

Pages/Volumes: 2 pp.

Publication Year: 2003

Subject Category: Onsite Power Systems

Document Type: Technical Reports

NTIS/GPO Number: 15006103

Abstract: Fact sheet describes the energy efficient and solar energy features of the Vista Montana Zero Energy Home, participant in the Zero Energy Homes initiative.

Report Numbers: FS-550-35305; DOE/GO-102003-1831

[**PDF 546 KB**](#)

Title: Calculating Energy Savings in High Performance Residential Buildings Programs: Preprint.

Author: Hendron, R.; Farrar-Nagy, S.; Anderson, R.; Judkoff, R.; Reeves, P.; Hancock, E.

Pages/Volumes: 15 pp.

Publication Year: 2003

Notes: Prepared for the International Energy Program Evaluation Conference, 20-22 August 2003, Seattle, Washington

Subject Category: Performance Analysis and Tests

Document Type: Technical Reports

NTIS/GPO Number: 15004462

Abstract: Accurate and meaningful energy savings calculations are essential for the evaluation of residential energy efficiency programs sponsored by the U.S. Department of Energy (DOE), such as the Building America Program (a public-private partnership designed to achieve significant energy savings in the residential building sector). The authors investigated the feasibility of applying existing performance analysis methodologies such as the Home Energy Rating System (HERS) and the International Energy Conservation Code (IECC) to the high performance houses constructed under Building America, which sometimes achieve whole-house energy savings in the 50-70% range. However, because Building America addresses all major end-use loads and because the technologies applied to Building America houses often exceed what is envisioned by energy codes and home-rating programs, the methodologies used in HERS and IECC have limited suitability, and a different approach was needed. The authors have researched these issues extensively over the past several years and developed a set of guidelines that draws upon work done by DOE's Energy Information Administration, the California Energy Commission, the International Code Council, RESNET, and other organizations that have developed similar methodologies to meet their needs. However, the final guidelines are tailored to provide accurate techniques for quantifying energy savings achieved by Building America to help policymakers assess the effectiveness of the program.

Report Numbers: CP-550-33622

[**PDF 321 KB**](#)

Title: Moving Toward Zero Energy Homes (Fact Sheet).

Pages/Volumes: 2 pp.

Publication Year: 2003

Subject Category: Onsite Power Systems

Document Type: Technical Reports

NTIS/GPO Number: 15006106

Abstract: Fact sheet describes the different projects and partners in the Zero Energy Homes initiative.

Report Numbers: FS-550-35317; DOE/GO-102003-1828

[**PDF 424 KB**](#)

Title: Consumptive Water Use for U.S. Power Production.

Author: Torcellini, P.; Long, N.; Judkoff, R.

Pages/Volumes: 18 pp.

Publication Year: 2003

Subject Category: Onsite Power Systems; Cooling Systems

Document Type: Technical Reports

NTIS/GPO Number: 15005918

Abstract: A study of power plants and their respective water consumption was completed to effectively analyze evaporative cooling systems. This technical paper will aid the High Performance Buildings Research Program by providing a metric in determining water efficiency in building cooling systems. Further analysis is planned to determine the overall water efficiency of evaporative cooling systems compared to conventional direct expansion systems and chiller systems with cooling towers.

Report Numbers: TP-550-33905

No PDF

Title: Screening Market Transformation Opportunities: Lessons from the Last Decade, Promising Targets for the Next Decade.

Author: Nadel, S.

Pages/Volumes: 21 pp.

Publication Year: 2002

Notes: The abstract of this document is posted with the permission of ACEEE. This report can be found at www.aceee.org/.

Subject Category: System Engineering Research

Document Type: Technical Reports

Abstract: From 1996 to 1998, several studies sought to identify the most promising targets for market transformation programs based on such factors as potential energy savings, measure cost-effectiveness, and likelihood of initiative success. As a result of that work, regional and national programs pursued many of the most promising opportunities. We begin this report by reviewing the results of the past studies and assessing how highly ranked initiatives have since fared in the market, and then we identify factors associated with success. Markets and market transformation thinking have both evolved since the earlier studies were conducted. In order to update this work, we conducted a new screening study to identify promising market transformation targets for the next decade. The next steps in this report include summarizing this analysis, identifying the most promising initiatives, and offering recommendations for program planners and implementers.

Report Numbers: 35352

[PDF 281 KB](#)

Title: On the Path to Zero Energy Homes.

Pages/Volumes: 6 pp.

Publication Year: 2001

Subject Category: Onsite Power Systems

Document Type: Technical Reports

Abstract: This brochure describes the Zero Energy Homes concept using a case study. Energy efficiency and solar energy technologies can result in zero net energy consumption from nonrenewable sources. During times of peak demand, a Zero Energy Home generates more power than it uses, thereby reducing power demand on the utility provider. During times of power outage, the home generates its own power, allowing the homeowner essential energy security. In a Florida study, a prototype Zero Energy Home outperforms a conventional model by providing almost all of its own power needs throughout the year.

Report Numbers: BR-550-29915; DOE/GO-102001-1287

No PDF

Title: FEMP Training Catalog for Fiscal Year 1996.

Pages/Volumes: 27 pp.

Publication Year: 1995

Subject Category: Performance Analysis and Tests

Document Type: Technical Reports

NTIS/GPO Number: DE95013142

Abstract: The mission of DOE's Federal Energy Management Program (FEMP) is to lead the way to a more efficient and less costly government by advancing energy efficiency, water conservation, and the use of solar energy and other renewable energy sources. As detailed in this comprehensive new catalog, FEMP accomplishes its mission in part through an extensive series of training symposia and workshops, as well as a variety of other information sources such as videos, a special Help Desk with a toll-free phone number, and the Internet.

Report Numbers: 20343; DOE/GO-10095-169

Title: Building Better Homes: Government Strategies for Promoting Innovation in Housing.

Author: Hassell, S.; Wong, A.; Houser, A.; Knopman, D.; Bernstein, M.

Pages/Volumes: 108 pp

Publication Year: 2003

Notes: [Online electronic version.](#)

Abstract: This report examines the structure, characteristics, and motivations of major participants in the housing industry to explore how innovation might be accelerated. It identifies options and strategies for the federal government to consider as it attempts to further advance innovation in housing to make homes more affordable, durable, and safe. Housing is the largest component of the nation's physical wealth, representing nearly 20 percent of the nation's gross domestic product. Therefore, innovation in that industry would contribute positively to increase productivity and provide benefits to a broad range of participants, including homebuilders, manufacturers, insurers, regulators, and homeowners. The federal government has been involved in promoting housing innovation for more than three decades, investing in research and showing a willingness to experiment with new ideas and approaches as it works with industry and other participants. In light of this government interest, this report puts forth proposals for federal government action: enhance research activities, strengthen the knowledge base, support the technology innovation pipeline, and improve market linkages. Within these proposals, a number of specific strategies are suggested to illustrate possible government actions. The list of strategies is not exhaustive but if adopted they should allow the government to better leverage what it is already doing by better focusing resources.

Report Numbers: 36012

Title: Guidelines for On-Site Use of New Scrap Wallboard in Georgia Residential Construction

Author: Gaskin, J.; Waltz, C.; Garber, M.; Wade, G.

Pages/Volumes: 2 pp.

Publication Year: 2002

Publisher, Place: University of Georgia's Biological and Agricultural Engineering Department

Notes: Posted on this site with permission from the University of Georgia's Biological and Agricultural Engineering Department.

Subject Category: Other

Document Type: Bulletins

Abstract: A fact sheet on the land application of drywall generated from residential, new construction

Report Number: 33988

Title: On-Site Beneficial Use of New Scrap Wallboard in Georgia Residential Construction

Author: Gaskin, J.; Waltz, C.; Garber, M.; Wade, G.

Pages/Volumes: 4 pp.

Publication Year: 2002

Publisher, Place: University of Georgia's Biological and Agricultural Engineering Department

Notes: Posted on this site with permission from the University of Georgia's Biological and Agricultural Engineering Department.

Subject Category: Other

Document Type: Bulletins

Abstract: A fact sheet on the land application of drywall generated from residential, new construction

Report Number: 33989

Title: Building America—working with American builders for energy-efficient, green and sustainable houses

Author: Love, P. M.

Pages/Volumes: 2 pp.

Publication Year: 2002

Subject Category: Other

Document Type: Program Summaries

Abstract: This 3-fold brochure describes the Building America program and its whole-house approach to energy efficiency.

Report Number: 33227

[PDF 414 KB](#)

Title: Summary of Green Building Programs

Pages/Volumes: 44 pp.

Publication Year: 2002

Notes: Work performed by the National Association of Home Builders (NAHB) Research Center, Inc., Upper Marlboro, Maryland.

Subject Category: Other

Document Type: Program Summaries

NTIS/GPO Number: 15000961

Abstract: In early 2002, the National Association of Home Builders completed a census of residential green building programs across the United States to assess differences and similarities among programs. This report catalogs different ways that builders participate in residential green building programs.

Report Number: SR-550-32390

[PDF 186 KB](#)

Title: RAND Summary of Federal Construction, Building, and Housing Related Research and Development in FY1999

Author: Hassell, S.; Florence, S.; Ettegui, E.

Pages/Volumes: 54 pp.

Publication Year: 2001

Notes: Posted with permission from RAND.

Subject Category: Other

Document Type: Technical Reports

Abstract: This publication presents the results of a search of the "Research and Development in the United States" (RaDiUS) database. The search sought to identify all federally funded research and development (R&D) activities related to the fields of construction, building, and housing in fiscal year 1999.

Report Number: 30877

[PDF 185 KB](#)

Title: Advanced Air Distribution Strategies Improve Performance of Palm Harbor Homes: Building America System Fact Sheet

Pages/Volumes: 2 pp.

Publication Year: 2001

Subject Category: Air Distribution Systems; Ventilation Systems; Manufactured Housing

Document Type: Project Summaries

NTIS/GPO Number: 15000167

Abstract: Palm Harbor Homes (PHH), one of the nation's largest producers of manufactured homes, and Building America's Industrialized Housing Partnership have teamed together to develop air-distribution and duct-sealing strategies that reduce energy use and increase comfort.

Report Number: FS-550-30540

[PDF 267 KB](#)

Title: Building America Partner Program: A Program of the Home Builders Association of Central New Mexico

Pages/Volumes: 2 pp.

Publication Year: 2001

Subject Category: Hot-Dry Climate

Document Type: Project Summaries

NTIS/GPO Number: 15000183

Abstract: This tri-fold brochure introduces the Building America Partner Program in central New Mexico and encourages home builders and home owners to participate.

Report Number: FS-550-30858

[PDF 216 KB](#)

Title: Home Builders Association of Central New Mexico: Building America Fact Sheet

Pages/Volumes: 1 p.

Publication Year: 2001

Subject Category: Hot-Dry Climate

Document Type: Project Summaries

NTIS/GPO Number: 15000184

Abstract: This one-page flier introduces the Building America Partner Program in central New Mexico and encourages homebuilders to participate.

[**PDF 1.2 MB**](#)

Title: Pulte Homes and Re-Engineering

Author: Andrews, S.

Source: HomeBuilder Magazine. Vol. 40(4) April 2001

Pages/Volumes: pp. 20-24

Publication Year: 2001

Notes: Posted with permission from HomeBuilder's Association in Metropolitan Denver.

Subject Category: Other

Document Type: Magazine/Newspaper Articles

Abstract: Pulte Homes is involved with the U.S. Department of Energy's Building America program with a Comfort and Energy Use Guarantee.

Report Number: JA-610-31044

[**PDF 780 KB**](#)

Title: Energy-Efficient Appliances: Office of Building Technology, State and Community Programs (BTS) Technology Fact Sheet

Pages/Volumes: 4 pp.

Publication Year: 2001

Subject Category: Other

Document Type: Bulletins

Abstract: This fact sheet for homeowners and contractors explains the energy savings potential of efficient appliances, how to purchase them, and how to maintain them.

Report Numbers: BR-810-26468; DOE/GO-102001-0788

[**PDF 1.0 MB**](#)

Title: Combustion Equipment Safety. Office of Building Technology, State and Community Programs (BTS) Technology Fact Sheet

Pages/Volumes: 4 pp.

Publication Year: 2000

Subject Category: Other

Document Type: Bulletins

Abstract: Combustion appliances that use fuels like natural gas, propane, oil, kerosene, or wood can be more efficient and effective at heating than electricity. However, careful installation is required to ensure safe and efficient operation. This fact sheet addresses problems posed by combustion equipment and provides suggestions for furnaces and water heaters, unvented space heaters and fireplaces, and stoves and ovens. Installation, combustion closet design, causes of and prevention of backdrafting are also covered.

Report Numbers: FS-810-26464; DOE/GO-102000-0784

[**PDF 212 KB**](#)

Title: Office of Building Technology, State and Community Programs (BTS) Strategic Plan (Brochure)

Pages/Volumes: 16 pp.

Publication Year: 1998

Subject Category: Other

Document Type: Strategic Plans

Abstract: This strategic plan is in direct response to the call by a broad array of interested parties, for the Office of Building Technology, State and Community Programs (BTS) to reduce fragmentation and increase focus. This plan outlines our goals for saving energy, three key strategies to accomplish these goals, and our commitment to improving how we do business.

Report Numbers: 28392; DOE/GO-10099-688

No PDF

Title: Building America. Energized (Fact sheet)

Pages/Volumes: 2 pp.

Publication Year: 1994

Subject Category: Other

Document Type: Strategic Plans

Abstract: An introduction to the U.S. Department of Energy Building America Program in 1994.

Report Number: TP-470-5776-J